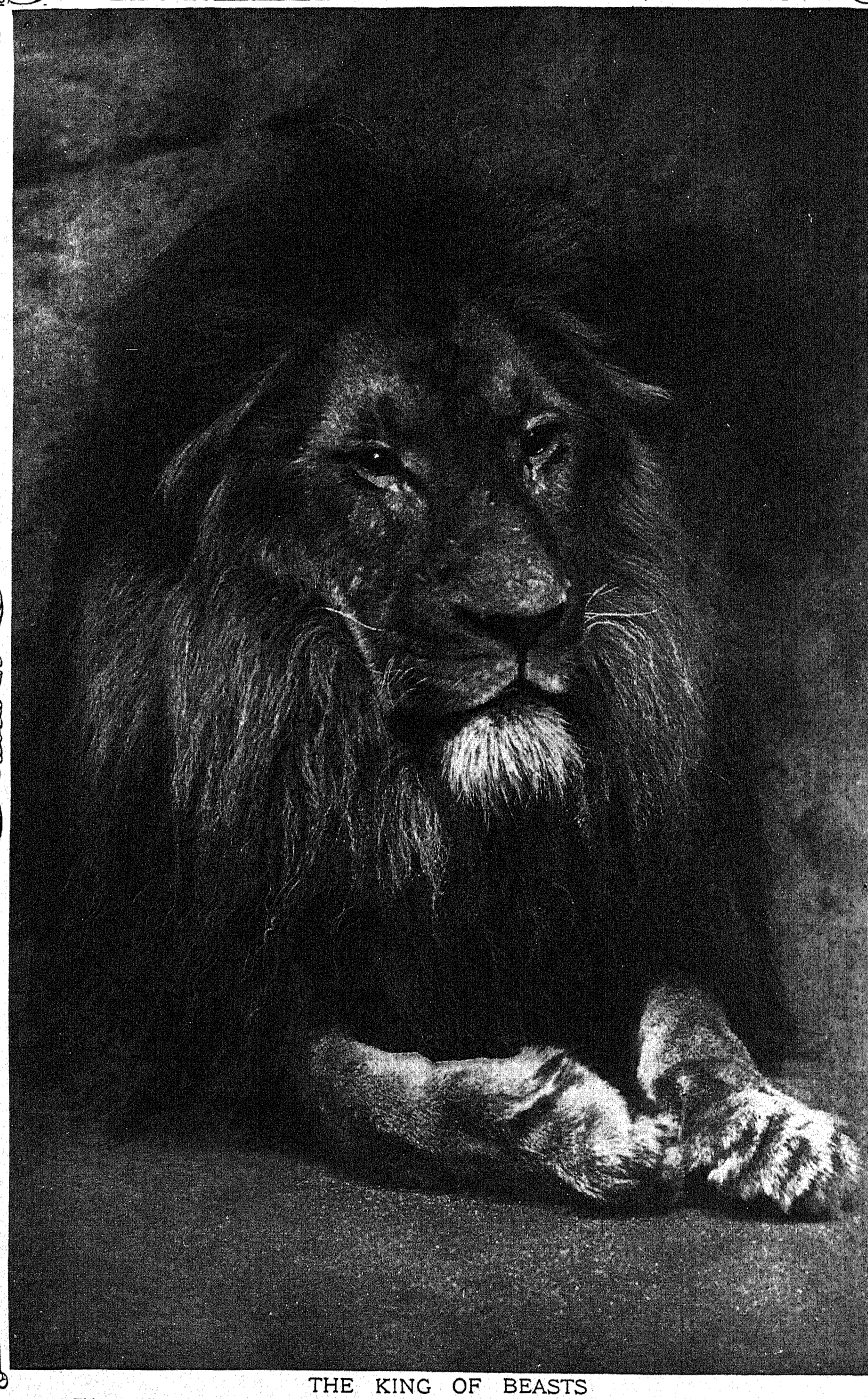


THE KING OF BEASTS

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The Book of Knowledge

The Children's Encyclopædia

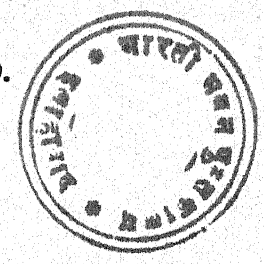
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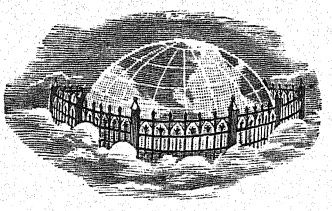
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रानीमंडी, इलाहाबाद
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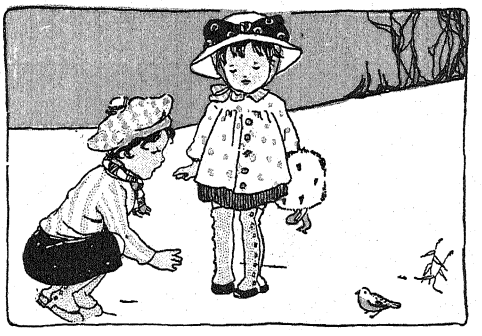


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030/133

LITTLE VERSES FOR VERY LITTLE PEOPLE

WHEN the snow is on the ground,
Little Robin Redbreast grieves;
For no berries can be found,
And on the trees there are no leaves.



The air is cold, the worms are hid;
For this poor bird what can be done?
We'll strew him here some crumbs of bread,
And then he'll live till the snow is gone.

"WILLY boy, Willy boy, where are you going?
I will go with you, if that I may."
"I'm going to the meadow to see them a-mowing,
I'm going to help them make the hay."

NOW what do you think
Of little Jack Jingle?
Before he was married
He used to live single.

THE gossips of the village—see,
Their fine lace caps are wearing.
They sip their dainty cups of tea,
White sugar they are sharing.



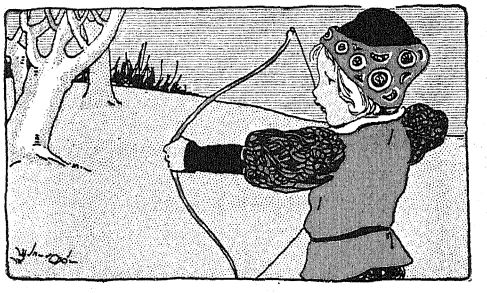
Their fingers shine with golden rings,
But—duty never matters!
Nothing is ready for the men,
And under—they are tatters!

HUSH-A-BYE, babby, lie still with thy daddy,
Thy mammy is gone to the mill
To get some wheat, to make some meat,
So pray, my dear babby, lie still.

A DUCK and a drake,
And a nice barley cake,
With a penny to pay the old baker;
A hop and a scotch
Is another notch,
Slitherum, slatherum, take her!

PUSSY sits beside the fire,
How can she be fair?
In comes the little dog,
"Pussy, are you there?
So, so, Mistress Pussy,
Pray, how do you do?"
"Thank you, thank you, little dog,
I'm very well just now."

THE white dove sat on the castle wall,
I bent my bow and made her fall;

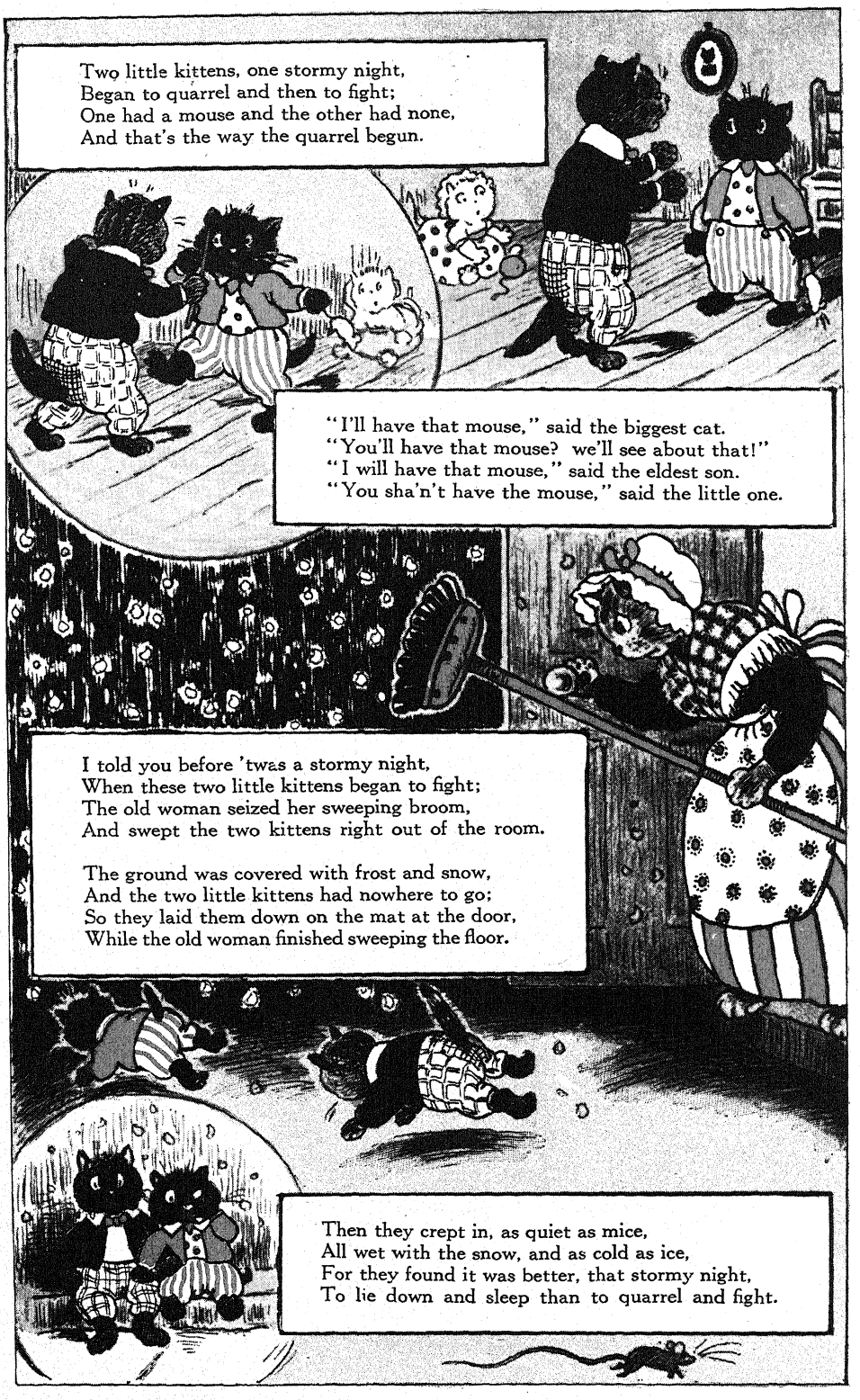


I picked her up, feathers and all,
And I rode away from the castle wall.

"LEND me thy mare to go a mile."
"She is lamed, leaping over a stile."
"Alack, and I must keep the fair—
I'll give thee money for thy mare."
"Oh, oh, say you so!
Money will make the mare to go."

HE loves me, he don't!
He'll have me, he won't!
He would if he could,
But he can't, so he don't!

I LOVE you well, my little brother,
And you are fond of me;
Let us be kind to one another,
As brothers ought to be.
You shall learn to play with me,
And learn to use my toys;
And then I think that we shall be
Two happy little boys.


Two little kittens, one stormy night,
Began to quarrel and then to fight;
One had a mouse and the other had none,
And that's the way the quarrel begun.
"I'll have that mouse," said the biggest cat.
"You'll have that mouse? we'll see about that!"
"I will have that mouse," said the eldest son.
"You sha'n't have the mouse," said the little one.
I told you before 'twas a stormy night,
When these two little kittens began to fight;
The old woman seized her sweeping broom,
And swept the two kittens right out of the room.
The ground was covered with frost and snow,
And the two little kittens had nowhere to go;
So they laid them down on the mat at the door,
While the old woman finished sweeping the floor.
Then they crept in, as quiet as mice,
All wet with the snow, and as cold as ice,
For they found it was better, that stormy night,
To lie down and sleep than to quarrel and fight.

के संग्रहालय से
दान से प्राप्त पुस्तक

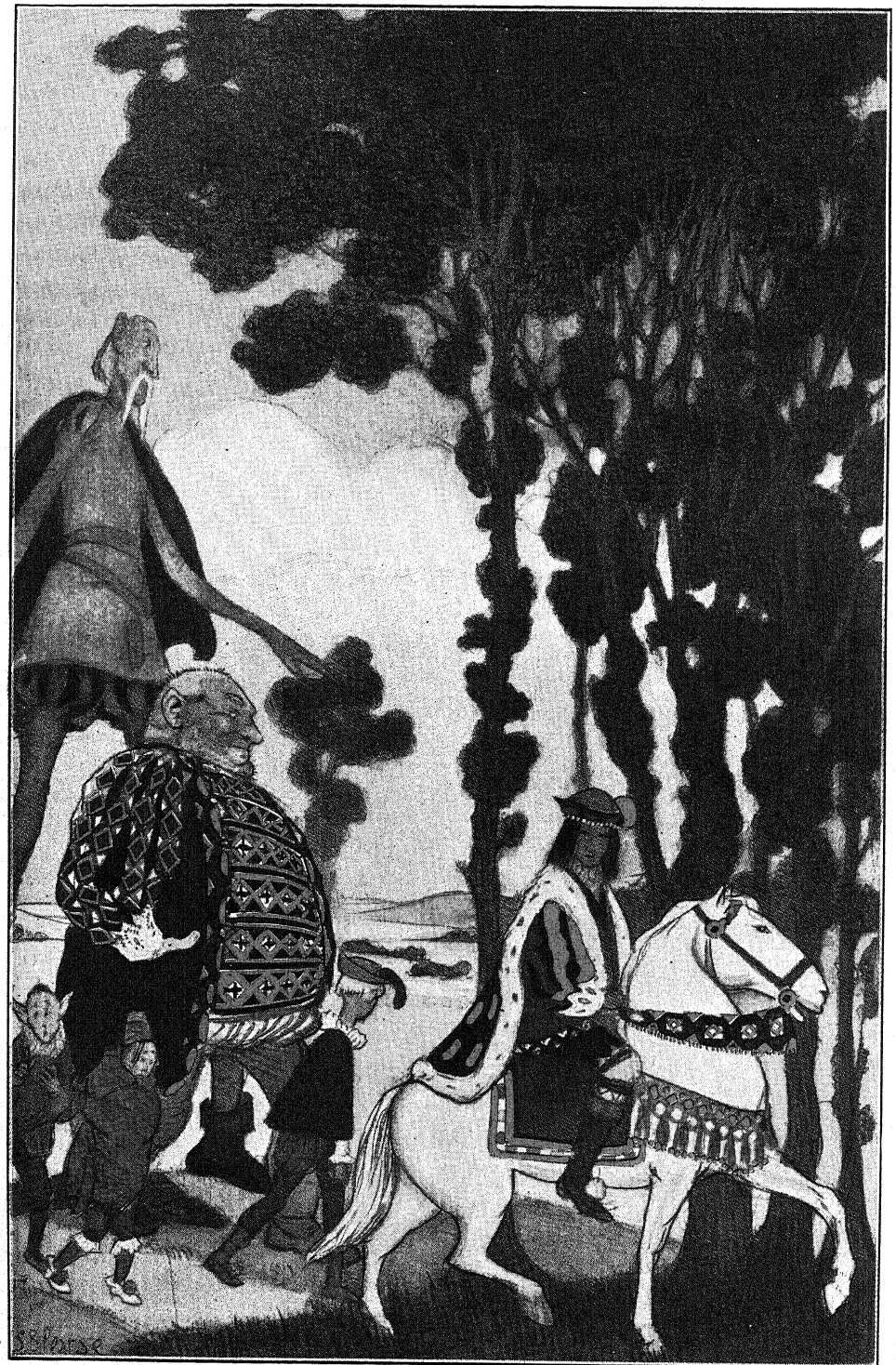


Wassail! Wassail all over the town,
Our toast it is white, our ale it is brown,
Our bowl it is made of the good mapletree;
We be good fellows all — and I drink to thee.

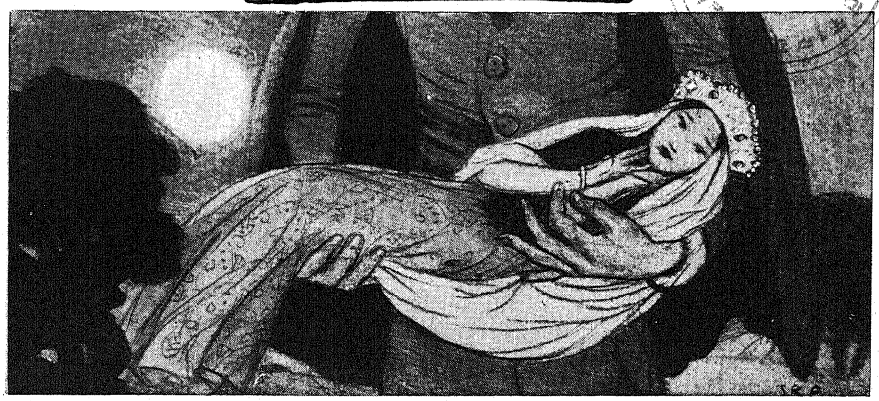
Here's to Grey Dobbin, and to his right ear,
God send our master a happy new year!
A happy new year as e'er he did see,
With my wassailing-bowl I drink to thee.

Here's to Black Beauty, and to his right eye,
God send our mistress a good Christmas pie;
A good Christmas pie as e'er I did see —
With my wassailing-bowl I drink to thee.

THE PRINCE GOES ON HIS TRAVELS



The Prince had five servants, by whose help he won the Princess—the tall man, the fat man, the man with wonderful ears, the man with wonderful eyes, and the man who shivered in summer and was hot in winter.



THE PRINCE'S FIVE SERVANTS

CONTINUED FROM 4286

MANY, many years ago there lived a beautiful Princess, who was so charming that everyone loved her. But, in spite of all the love and admiration that was showered upon her, the Princess was not happy, for she had a very cruel mother, who never seemed so happy as when she was making others miserable.

It can easily be understood that with such a Queen the Palace was by no means the most agreeable place to live in, and the Princess eagerly looked forward to the day when some brave Prince would fall in love with her, and take her away to a home of her own. But, alas! no sooner did a suitor appear than the old Queen set him, as the price of her daughter's hand, some impossible task, on the understanding that failure should mean his death; and so the poor man lost not only his bride, but his head as well.

One day, when the Princess was walking in the forest with her maids, idly wondering whether there could be another being in the whole wide world so wretched as she was, a handsome Prince rode by.

"What a lovely girl!" thought the Prince; and he watched her till she passed out of sight.

Now, the Prince had fallen in love with the Princess at first sight, and he determined to win her. Losing no time, he set out the next day for the Palace. On the outskirts of a wood, through which he had to pass on his way, he noticed what he thought to be a huge beast lying by the wayside. But, on going nearer, he found that it was no beast, but a man—the biggest man he had ever seen. He touched him on the shoulder, and the man stood up, and asked:

"Do you need a servant?"

"If I did," returned the Prince, "I don't know what I should do with such a great fat fellow as you."

"What does my size matter," answered the man, "so long as I discharge my duties faithfully?"

This answer pleased the Prince so much that he engaged the man on the spot. When they had gone along a little farther, the Prince came across a man who lay on the grass with his ear close to the ground.

"What are you doing?" asked the Prince.

"Listening," said the man. "I can hear all that goes on in the world."

"You may be valuable to me some day," said the Prince. "Follow me."

Before they had gone very far they came across a pair of feet, and, a little farther on, a pair of legs; and then they found a body; and then, at last, the head.

"Bless me," exclaimed the Prince "what an extraordinary man!"

"Oh," replied the man, "this is nothing to what I can do when I stretch myself to my full height! When I choose I can make myself three times as tall as the highest mountain."

"Follow me," said the Prince. "Some day you may be of great service."

Then an extraordinary thing happened. The man muttered some words and in an instant he shrank to the size of an ordinary man.

This strange little band journeyed on till they came upon a man who shivered with cold though he sat in the blazing sunshine.

"Are you ill that you shiver in this heat?" inquired the Prince kindly.

"Indeed," answered the man, "something must be wrong with me, for the sun, instead of warming me, sends cold thrills over me; while the cold and ice of winter oppress me so that I often faint as from heat."

"How very extraordinary!" said the Prince. "Still, as you seem to have nothing to do, follow me, and I will take you into my service."

A little farther on they found a man who was standing on tiptoe, eagerly scanning the land.

"For what are you looking?" asked the Prince.

"I am watching the world," replied the man. "My eyes are so sharp that I can see from end to end. If you need a servant, you may find me very useful."

"True," said the Prince. "Follow me."

When they arrived at the Palace, the Prince was shown before the Queen, from whom he begged the hand of the lovely Princess.

"The man who would win her," replied the old Queen, "must earn her."

The Prince was prepared for this, and asked what his task was to be.

"There are three," replied the Queen. "First, bring me the ring that I dropped in the Red Sea."

"That is simple," said the man who could make himself as tall as the highest mountain.

"Why, there it is!" exclaimed the sharp-eyed man, "just by that green rock." Whereupon the tall man stretched himself to his full length, bent over, and picked it up.

The Queen was furious when the Prince handed her the ring, although she pretended to be pleased.

"You have indeed done well," said she; "but you may not find your second task so easy. Yonder are a hundred fat oxen; these you must eat before noon. And in a cellar below are one hundred casks of wine; these you must drink so that not a drop remains."

"May I invite a guest?" asked the Prince.

"Certainly," replied the Queen, with a spiteful laugh. "One, and one only."

The Prince turned and found the fat man at his side.

"Just leave this to me, Master," said the man, well pleased at the prospect. And by noon nothing remained of the feast but a hundred empty wine-casks and a pile of bones.

This time the Queen could scarcely hide her anger.

"Your third task you may find more difficult to perform," she said. "At sunset I shall bring my daughter to your apartments, and leave her in your care. See to it that she is still there when I return at midnight."

"That does not sound impossible," thought the Prince; "with the help of my five servants I think I can manage to keep the Princess."

At dusk the Princess arrived. The Prince led her to a low-cushioned seat by the window, and the Queen went away. As the door closed behind her, the Prince clapped his hands, and immediately his servants made silent preparations for the watch. The tall man stretched himself to his full length, and wound himself round and round the little house, so that none could go in nor pass out; the sharp-eyed man closely watched the movements of the Queen; while the man with the wonderful hearing remained motionless with his ear to the ground.

Within the room all was silence. The moon streamed through the open window on to the face of the lovely Princess, who sat with folded hands gazing idly at the stars; and behind, his face in shadow, stood the Prince watching her, and wondering at her exquisite beauty.

But suddenly, as the clock struck eleven, the old Queen threw a spell over them, so that they all fell asleep; and while they slept the Princess vanished. But, clever as she was, the old Queen had

no powers of enchantment after a quarter to twelve, and as the clock chimed they all awoke, and the Prince started to his feet.

"Alas, alas!" he cried, "my beautiful lady is gone! All is lost, lost!"

"Not so," cried the man with the wonderful ears. "I hear her weeping, but the sound comes from afar."

"I see her seated on an enchanted rock three hundred miles away," cried the sharp-eyed man.

"Describe the place," said the tall man, "and I will bring her here in three minutes."

When the old Queen came back at twelve o'clock, she was amazed to find her daughter sitting just where she had left her.

"Take her; you have won your bride," she said to the Prince. But as she passed she whispered to the Princess:

"I would scorn to be won by a pack of servants."

The idea was so displeasing to the pride of the Princess that she turned to the Prince, and said:

"Before you can win *my* consent, one of your wonderful servants must consent to be flung on a pile of three hundred burning logs of wood, and there remain till the fire has quite burned out."

"You hear," said the Prince to his servants. "Will any of you consent?"

"I will," answered the frosty man, stepping forward without any hesitation.

So the logs were brought, and the fire started; and for three whole days the Court watched the man as he lay shivering and shaking with cold on the burning pile. When the last flame had flickered out, and the glowing embers had turned grey, the frosty man rose to his feet and said that he had never felt so cold in his life.

The Princess was delighted that her handsome lover had once more triumphed. She held out her hand, and the Prince bent down and kissed it.

Now that the old Queen no longer had any excuse for delay, the bridal day was fixed, and the wedding took place amid scenes of great enthusiasm, for the Princess was much loved by her people, and the Prince had shown himself to be as clever as he was handsome.

After the ceremony, the Princess arrayed herself in her finest dress and her most costly jewels, and together she and the Prince set out for the Palace. Here they were received with great kindness by the old King and Queen, and they lived very happily together all the rest of their lives.

HOW THE BAD NEWS REACHED THE KING

THERE is a good story told of that strange personage, Frederick the Great of Prussia. He had a good knowledge of French and a taste for literature and music. He was very loyal to his mother and much attached to his sister, Wilhelmina, and usually very kind-hearted. Sometimes, however, his temper got the best of him and he was hasty in his words.

To one creature he was most passionately devoted, and this was a horse. It was a handsome charger, fit for a king to ride upon, and so intelligent and affectionate that it quite softened and won the heart of its royal master.

One day, when he was very much put out and busy, he learned that this favorite was ill. In a fit of petulant rage, feeling his own insignificance at not being able to keep even a horse alive, even though he was a great monarch, he called out that any man who should inform him that the horse was dead should be instantly hanged.

A few days passed without any change in the charger's condition, but one morning the equerries, in going their round of the stables, were met by the groom, who told them that the King's favorite horse was dead.

Just imagine their consternation. Who was to tell the King? Who was to run the risk of being hanged? They stood talking and proposing various plans until the hour arrived for the daily bulletin to be delivered to his Majesty. At that moment one of the youngest equerries told the groom not to be afraid, and went himself to the King.

"Well!" demanded Frederick; "how is the horse?"

"Sire," replied the equerry, "the horse is in his usual place. He is lying down. He does not move. He has no strength. He does not eat. He does not drink. He does not sleep. He does not breathe. He does not——"

"Then, indeed," cried the King impatiently, "he must be dead."

"Your Majesty has spoken truly," replied the equerry calmly; "and it is you, sire, who have announced the fact."

THE FABLES OF ÆSOP THE SLAVE

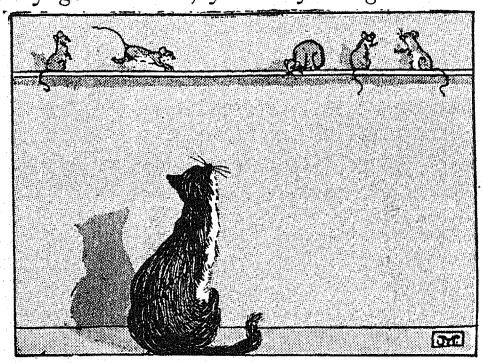
THE CAT AND THE MICE

A CERTAIN house was overrun with mice, so its owners got a cat, who caught and ate a great number of the mischievous little animals.

The mice, finding their numbers growing thinner, consulted together how best to preserve themselves from the jaws of the cat, and they decided that none of them should go down below the top shelf, where the cat could not get at them.

The cat, finding that the mice no longer came down, got very hungry, and resolved upon a clever trick. She hung by her hind legs on a nail on the wall, and pretended to be dead, hoping by this means to persuade the mice to come down.

She had not been hanging there long before a cunning old mouse peeped over the edge of the shelf, and said: "Ah, my good friend, you may hang there as



long as you like; but I certainly would not trust myself with you even if I knew that your skin was stuffed with straw."

It is better to be on the safe side.

THE TRAVELERS AND THE BEAR

TWO men, traveling through a forest together, promised to stand by each other in case any danger should threaten them. They had not gone very far when a bear came rushing out of the wood.

Thereupon one of the travelers, being a good climber, got up into a tree. The other, who could not climb, fell flat upon his face and lay quite still, holding his breath. The bear came up and smelled him, but, supposing him to be dead, went back into the wood without doing him any harm.

When the danger was over, the man who had climbed the tree came down to his companion, and asked him what it was the bear said when he put his mouth so close to the man's ear.

"Why," answered the other, "he advized me to take care in future not to put



any trust in such a coward as you are, or I should always be deceived."

A true friend will always stand by his companion in danger.

THE FIR-TREE AND THE BRAMBLE

A TALL, straight fir-tree that stood towering up in the forest was very proud of his height and dignity, and despised the little shrubs which grew beneath him. One day a bramble asked him why he was so proud.

"Because," replied the fir-tree, "I look upon myself as the finest tree for beauty of any in the forest. My top shoots up towards the clouds, and my branches spread round in constant beauty, while you crawl on the ground, liable to be crushed by every animal that comes near."

"All this may be true enough," replied the bramble; "but when the woodman has marked you for cutting



down, and the axe comes to be applied to your root, I fancy you will wish that you could change places with me."

Pride always goes before a fall.

FOOLS AND JESTERS AND KINGS

ALMOST as old as history is the Court fool, or jester, of whom we read in so many of Shakespeare's plays. The reason for these droll creatures is not generally known. They were employed to aid digestion.

When we laugh, we exercise certain muscles which play an important part in the digestion of food. The more we exercise these muscles the better can we digest our dinners. People in ancient times, who ate enormously, soon discovered that a dinner at which they sat glum and silent, or at which they only talked about serious things, gave them a good deal of bother to digest. And so funny fellows were procured, who by their antics sent the eaters into shouts of laughter.

But, as the world moved on, the absurd follies of fools ceased to make men laugh, and instead of the fool came the jester. There was all the difference in the world between the Court fool and the Court jester. The fool was a mere knockabout clown; the jester was a polished and brilliant wit, an inimitable teller of good stories, a critic of politics, religion, and manners. The jester looked down upon the clown, and despised him for an ignorant person of low degree. The jester became an influential courtier, one of the most powerful men at the King's elbow.

He could avert war, save a noble from execution, get justice for the poor, and improve manners. So long as he kept the King amused, or served his Majesty with the sauce of laughter at dinner, the jester was one of the very first men in the kingdom. The first Court fool known in history was a woman. This was Iamby, who was famous at the Court of the Queen of Eleusis for her frolicsome humor, her funny stories, her playful gambols, and her merry tales.

THE FABLES OF ÆSOP IN FRENCH

THE ENGLISH VERSION OF THESE FABLES IS GIVEN ON PAGE 891.

LE LOUP ET LA CIGOGNE

UN loup, mangeant son dîner, un jour, avala un os qui s'arrêta dans sa gorge. Il errait en hurlant, demandait à tous les animaux qu'il rencontrait de l'aider et promettait une forte récompense à qui retirerait l'os. Enfin, une cigogne, avec un cou et un bec longs et minces, entreprit la chose.

Elle introduisit son long bec dans la gorge du loup, saisit l'os et le retira; mais quand elle demanda sa récompense, le loup répondit en riant : " Estimez-vous heureuse que je n'ai pas mordu votre tête quand elle était dans ma gueule."

Il y a des gens sans reconnaissance pour les services rendus.

LA GRENOUILLE ORGUEILLEUSE

UN bœuf qui paissait dans un champ, mit par hasard son pied au milieu d'une famille de jeunes grenouilles et en écrasa une. Les autres racontèrent à leur mère ce qui était arrivé et dirent que l'animal en question était le plus gros qu'ils eussent jamais vu.

" Était-il aussi gros que ceci ? " demanda la vieille grenouille en se gonflant, de la façon particulière aux grenouilles.

" Oh, bien plus ! " dirent les petites grenouilles.

" Aussi gros que ceci ? " demanda-t-elle, en redoublant ses efforts.

" Oui, mère," dirent-elles, " vous ne seriez jamais aussi grosse, même en vous gonflant à en crever."

La vieille et sotte grenouille fit encore un effort pour se gonfler davantage, et elle éclata et mourut.

N'essayez jamais de vous faire prendre pour une personne plus importante que vous n'êtes en réalité.

LE GEAI VANITEUX

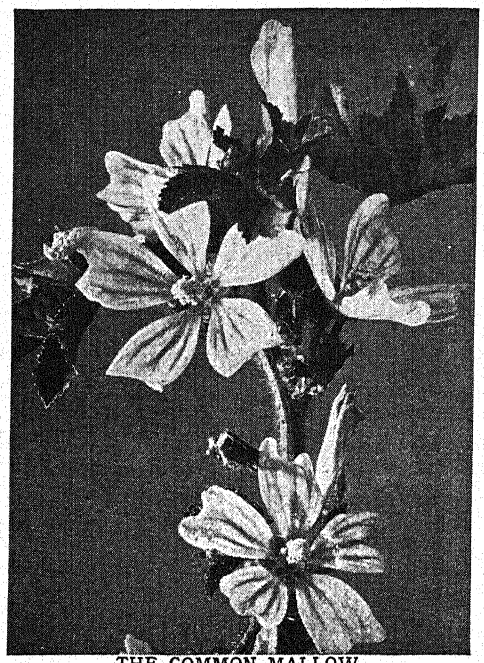
UN geai était si vaniteux que ses simples plumes noires ne le satisfaisaient pas. Il ramassa un grand nombre de belles plumes tombées de la queue d'un paon et les attacha avec soin sur son dos.

Puis il essaya de se mêler à la famille des paons comme s'il en faisait partie, mais sa ruse fut bientôt découverte et les paons le frappèrent tant à coups de bec, qu'il fut heureux de s'échapper.

Il retourna chez ses anciens amis, les geais ; mais ils le chassèrent et ne voulurent plus être ses amis.

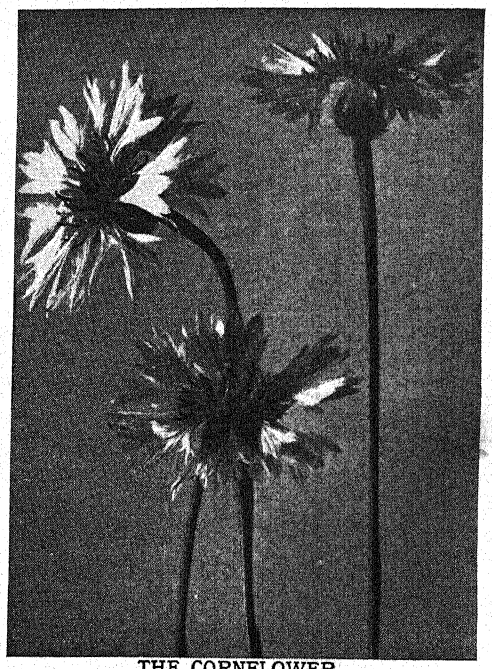
Nous serons découverts, si nous prétendons être plus que ce que nous sommes.

THE NEXT STORIES ARE ON PAGE 4409.



THE COMMON MALLOW

This plant is called rags-and-tatters, but that is not a fair name, for the pale purple flowers are very showy, and, except where they have been riddled by snails and caterpillars, the leaves are quite attractive.



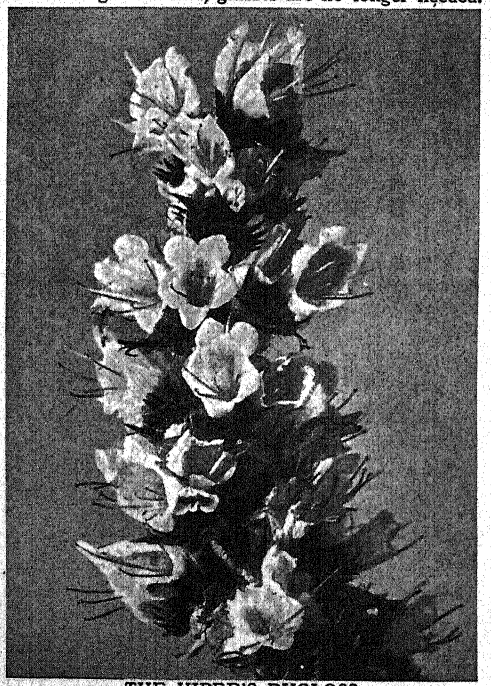
THE CORNFLOWER

This is the German national flower. A lotion used to be made from the flowers to strengthen the eyes, and the French call them break-spectacles, meaning that, after using the lotion, glasses are no longer needed.



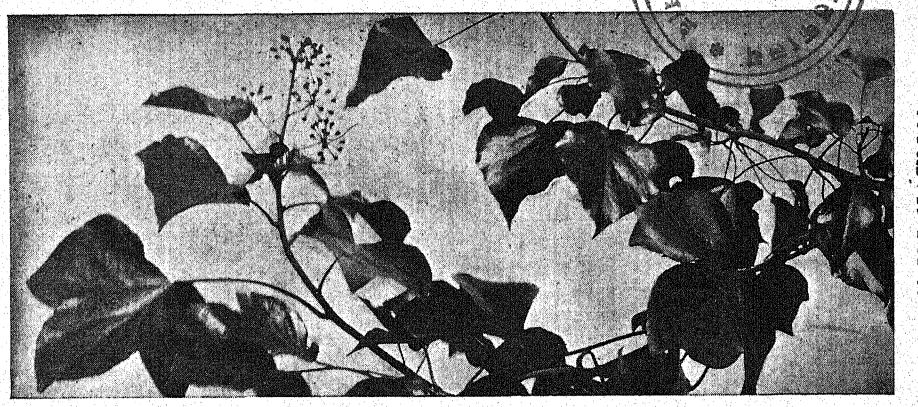
THE CHRISTMAS ROSE

This is one of the garden flowers rarely seen on this side of the ocean, and is not a rose. Its root is called black hellebore, and although acridly poisonous, has been used as a medicine. It blooms very early in the spring, and even in freezing weather.



THE VIPER'S BUGLOSS

This handsome plant, with its red and blue flowers, was supposed to give protection against a viper's bite. The name means an ox's tongue, and refers to the shape of the leaves. The flowers are very rich in honey, and are much visited by bees and other insects.



PLANTS OF TWO WORLDS

CONTINUED FROM 4213



THERE are a number of flowers which we now value highly, that have been introduced into North America in much the same way as those we have called weeds. On the other hand there are others that grow naturally in both the Old and the New Worlds.

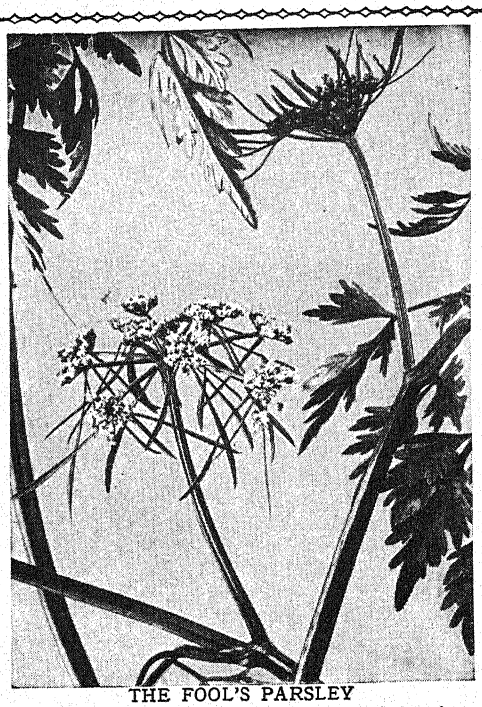
THE GOLDEN STARS OF THE WALL-PEPPER

In the first group, we find the wall-pepper, which spreads its stem, crowded thick with scale-like succulent leaves, in great mats, over stones and dusty waysides. Probably we are well acquainted with it as a rockery flower in gardens; here it is quite wild and very abundant, its wide-spreading, fine petals looking like golden stars on green cushions. All the stonecrop family have thick leaves, in which they store up moisture to enable them to grow in the hot, dry, stony places where they are mostly found.

THE DELICATE WOOD-SORREL OF THE NORTH

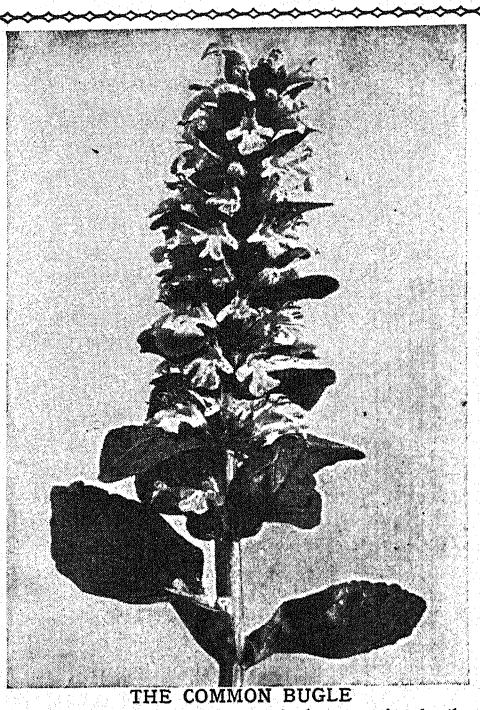
The delicate wood-sorrel grows in cold woods throughout the northern hemisphere. Its knotted, slender, crimson stems run through the leaf-mold, and put out their large trefoils, that look like pale clover-leaves. Above them rise the thin stalks that support a single flower of purest white, streaked with the finest line of purple to show where the nectar is to be found at the base of the petals. There are ten stamens, and the single pistil has five stigmas. The seed-vessel has five ridges, which split when the seeds are ripe, and they are shot out to a distance of a yard or more. Before the seeds are ripe, the plant keeps the seed-vessel hidden under its leaves; but afterward the stalk stands upright to raise the seed-vessel well above the leaves, so that when the seeds are fired out, so to speak, they may land far away. The wood-sorrel, like some violets, has two kinds of flowers,—one kind is that which we have just described, and the other has little greenish, bud-like affairs borne on recurved stalks at the base of the plant. Although these flowers have no means of attracting insects they are able to develop seeds that will grow as they pollinate themselves. If insects visit the gay flowers above, well and good, but if not the cleistogamous (as they are called) inconspicuous flowers will ripen fruit. The three heart-shaped leaflets drop in the sunshine. Some people think that sorrel is the real "shamrock" which was mentioned by St. Patrick.

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THE FOOL'S PARSLEY

This plant is poisonous. Because people have often gathered it under the impression that it was parsley, and have died through eating it, it has gained the name of fool's parsley. It has an evil smell.



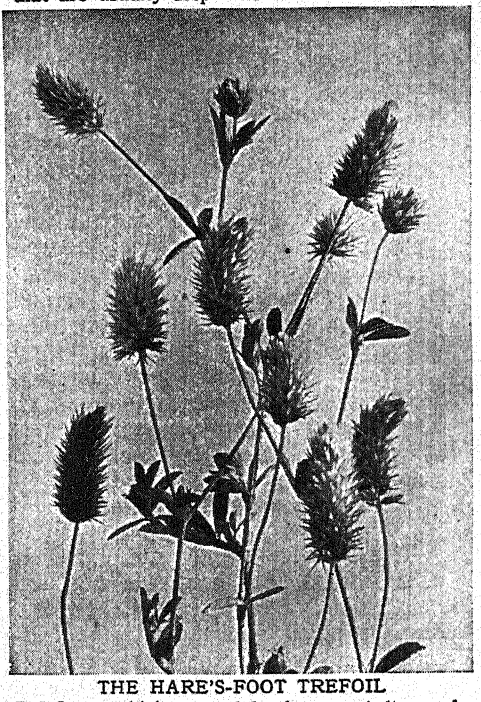
THE COMMON BUGLE

The common bugle does not look attractive in the woods or by the roadside, where it creeps along, sending up high flowering stems, with flowers that are usually deep blue but sometimes white.



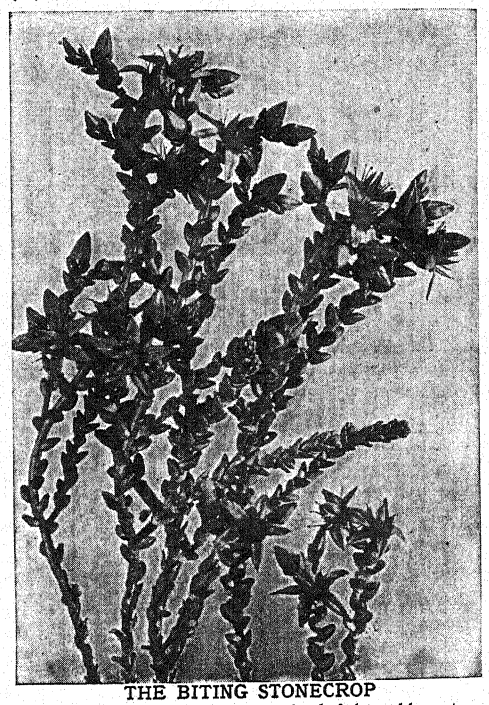
THE WOODY NIGHTSHADE

The woody nightshade, or bittersweet, a familiar object in our woods, belongs to the potato family. The flowers are purple and yellow, and the leaves vary in shape. The berries are a brilliant scarlet when fully ripened. It grows in thickets, and is dangerous to eat.



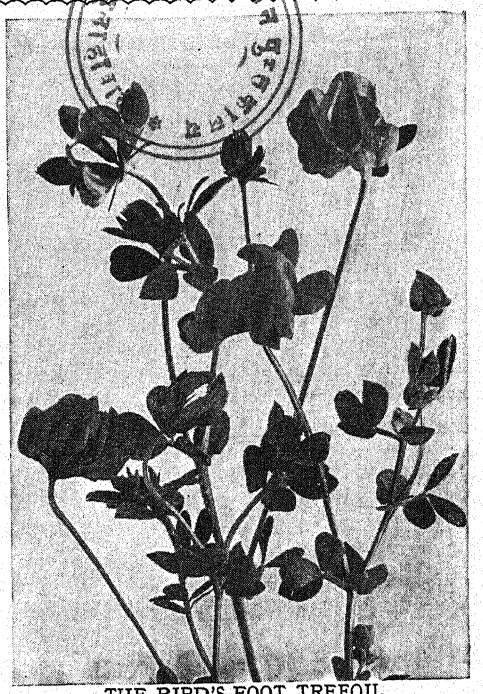
THE HARE'S-FOOT TREFOIL

This flower, which is one of the clovers, gets its popular name from a supposed resemblance of its soft, hairy blossoms to a hare's foot. It grows in dry fields, and its numerous flowers are pinky white in color and delicate. The plant grows about a foot high.



THE BITING STONECROP

When this plant is in blossom, its bright golden stars present a very attractive sight. Its leaves have a sharp, biting taste, which has given the plant its name.



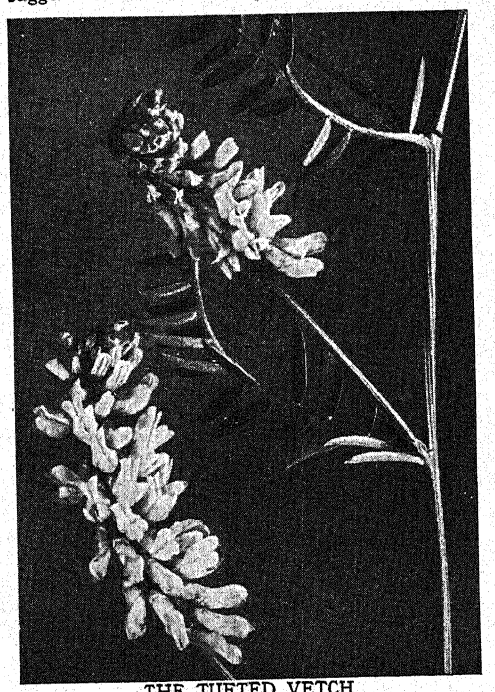
THE BIRD'S-FOOT TREFOIL

This is one of the pea family, and the bright little flowers are succeeded by pods which spread out and suggest a bird's foot. The plant is used for fodder.



THE GERMANDER SPEEDWELL

This has various names, birdseye, and catseye, and it is often called forget-me-not, although the real forget-me-not is another flower—the myosotis. The germander speedwell used to be considered unlucky.



THE TUFTED VETCH

This is one of the most ornamental of wild flowers. Its purple flowers add a delightful touch of color wherever it grows. When the flower withers, the seed-vessel grows into a pea-pod with a curly tail.

THE HERB-ROBERT IS A SMALL GERANIUM

In the large, wide-spread geranium family we find the soft, hairy herb-robert, in our country often perched on damp rocks and banks. It has much-divided leaves, more or less reddened (and sometimes entirely red), which have an unpleasant smell when passed through the hands. This has led to its being called in some parts of England by the equally unpleasant name of "stinking Bob." It has pale, magenta flowers with fine lines, or "honey-guides," of red on its petals. Its stems are red, also, and its joints, where the leaves are attached, are swollen. It flowers all summer. The seed-vessels have a long column or beak with a circle of five one-seeded pockets at its base. By a process of unequal drying when the seeds are ripe, the coverings of these cavities, which are prolonged into long tails reaching to the apex of the beak, are suddenly jerked up and curled in rolls at the tip of the fruit, and the seeds therein are sent flying away. It is done so quickly, when one touches a thoroughly ripe capsule, that it makes a person jump. And this is the habit of all the geraniums.

Plants which are found along railroad tracks and about seaports, the seeds of which have slipped out of grain-bearing freight-cars, or during the process of unloading grain from ships; or have, perhaps, been brought in the ballast of the ships, are often called ballast plants. They are generally inoffensive, and are regarded as fugitives, as it were, from foreign countries. Occasionally, however, they become weeds.

THE VIPER'S BUGLOSS, SOMETIMES CALLED THE BLUE-WEED

There is a stretch of railroad track along the Hudson River that is gay with the viper's bugloss, a bristly ballast plant with oblong and lance-shaped leaves and a straight stem three feet high. From the upper part of this stem, short, curved side-branches are given off, which bear crowded flower-sprays. These flowers, before they fully open, are often purplish-red in color, but when they expand they turn to a most brilliant red. In Canada and elsewhere it is called blue-weed, and is a troublesome plant in rocky pastures. The quartette of little nutlets that each plant contains are scattered broadcast as the dead plants are blown over the country. The scarlet stamens, and the style, jutting well out from the flower, form a platform for insects, by means of which they both deposit and take away pollen carried on the under surface of their bodies. The blue-weed, in spite of its coarseness, is a very close relative of the delicate forget-me-not and heliotrope, all alike belonging to the borage family.

THE YELLOW-FLOWERED BIRD'S-FOOT TREFOIL

The bird's-foot trefoil with pale yellow flowers that is common in every field of England, here appears only as a ballast plant. It belongs to the pea family and has some odd habits. It is one of the plants that sleep at night, each one of the triple leaflets hanging straight down from the tip of the leaf-stalk after sundown. The wings are folded over the keel, so as to form a kind of cushion for a honey-seeking insect, and as it settles down astride their saddle a little, worm-like thread of paste appears at the tip of the keel and sticks to the bee's under-surface. This is pollen. The club-shaped anthers form a sort of partition between the main cavity of the keel and a small one at its very tip. This latter space is filled with pollen by the anthers, the longest style projecting into the mass. Pressure on top of the keel forces the stamens and the style upward and forward so that they push the pollen out through a small hole at the tip, exactly as the plunger of a pump forces water out of its spout. If the keel be pressed, the style itself is pushed out, and is likely to take up some pollen from the visitor's coat.

THE FLOWER OF THE STONE-CLOVER LOOKS LIKE A SOFT BRUSH

In the pea-flowered family we also find the old-field or stone-clover, whose fluffy heads of flowers are supposed to resemble the foot of a tiny hare, whence its common American name of rabbit's-foot clover. It does not look much like a clover at first sight, for its trefoil leaves have very slender leaflets and its calyx teeth are so much longer than the petals that they give the flower-head the appearance of a soft brush, amid which the tiny pink petals are almost hidden. It has become very thoroughly naturalized, but is useless for fodder, and, therefore, is left in sole possession of disdained, dry, stony fields.

THE TUFTED VETCH, ALSO CALLED THE COW-VETCH

The tufted vetch, another pea, is just as much a native of America as it is of Europe or Asia. Its weak stems thrust out dense, one-sided sprays of bright blue drooping flowers, that, like those of the hare's-foot clover, are fertilized by means of the pressure exerted on the keel. It is a persistent perennial, difficult to get out of old meadows, but as its foliage with many leaflets affords a good fodder (whence, perhaps, its name of cow-vetch), this does not so much matter.

FOOL'S PARSLEY, AN UNDESIRABLE IMMIGRANT FROM EUROPE

In the carrot family, which contains many poisonous plants, very easily mistaken for harmless ones, we have the fool's parsley, which, although originally brought from Europe, has become sufficiently at home in waste places to be guarded against. It is a slender-stemmed herb, with delicate, shiny, much-divided leaves, known as fool's parsley because no wise person would be likely to mistake its uncurled leaves for those of the true parsley. It grows to about two feet in height and bears umbels of tiny white flowers. From the base of each umbel hang down from three to five slender green points, or bracteoles. This should be remembered as an especial point by which to recognize this poisonous plant. Its seeds, that are not to be tasted, are in pairs forming nearly spherical strongly-ribbed, shining fruits.

THE POISONOUS WOODY NIGHTSHADE, OR BITTER-SWEET

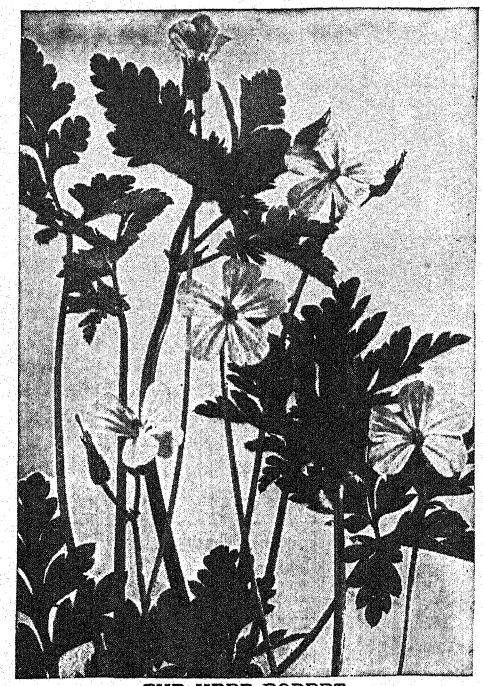
Another one of the poisonous plants that we find depicted here, is the woody nightshade, or bitter-sweet, a member of the potato family, which has made itself thoroughly at home in our thickets, and climbs in a half-hearted manner over shrubs, or merely straggles along the ground. It has rather unusual leaves, ovate or hastate in general outline, but three-lobed or divided, the apical lobe being the largest. It has a typical potato blossom, in cymes, star-like, with yellow stamens projecting like a beak, but usually the flower is dull purple. The berries succeeding the summer blossoms are among our most striking fruits, as they are fleshy and egg-shaped and when fully ripe are a brilliant scarlet; but in one cluster we may find green or yellow, as well as red berries. It is a dangerous plant to eat.

THE LEAVES OF THE SETTERWORT ARE GREEN ALL WINTER

In Great Britain they have also the early flowering, stinking hellebore, or setterwort, that is also a hellebore, both of them belonging to the buttercup family. As in some other members of this family, the showiness of the flowers is due to the large sepals. The setterwort's leaves are large and handsome, and are divided into a number of leathery, slender leaflets, which spread out from the top of the leaf-stalk like the outstretched fingers of our hands. They are dark green, and retain their color and freshness throughout the winter; but in the new year the stem makes a sudden growth and puts forth oval, leafy bracts and large, drooping flowers. We should scarcely find the true petals unless we knew where to look for them, for they have been turned into little green two-lipped tubes that are filled with nectar, and these are hidden at the bottom of the flower beneath the many stamens that stand crowded around the two or three pistils. The flower opens slightly, when the curved stigmas overtop the unripe stamens and receive pollen brought by any early bees or flies, which have to crawl over them and into the flower to reach the nectar. Later the stamens spread out more, the outer sepals get a line of purple along their edges, and the anthers shed their pollen. When this is all gone the stamens drop off, and the pistils grow into seed-pouches that open at the top, something like those of the columbine.

THE SWEET MARJORAM HAS TWO KINDS OF FLOWERS

Another garden plant which we know well is the sweet marjoram, a mint that in its native land covers wide stretches of downland. Its perennial underground rootstock sends out runners all round, so that we always find it in masses. The branching, square stems grow to about three feet in height, and are clothed with oval leaves that end in clusters of purple flowers. These are of two sizes, the larger dark purple ones having both stamens and pistil, while the smaller and paler ones have only a pistil. The yellow-dotted calyx is almost hidden by the larger purple bracts. Beginning to flower in July, they keep



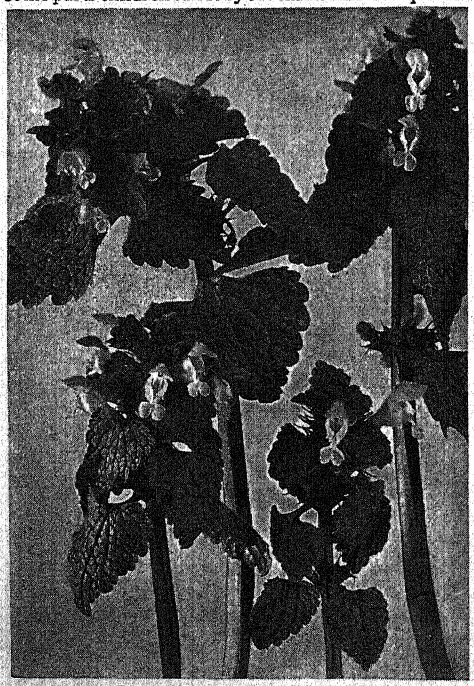
THE HERB-ROBERT

The dainty little herb-robert, with its delicate pink flowers and its crimson leaves, is a wild geranium. In some parts children call it by the name kiss-me-quick.



THE STINGING-NETTLE

We all avoid the stinging-nettle, although if the leaf be grasped quickly and firmly it gives no pain. The flowers are smaller than those of the dead-nettles.



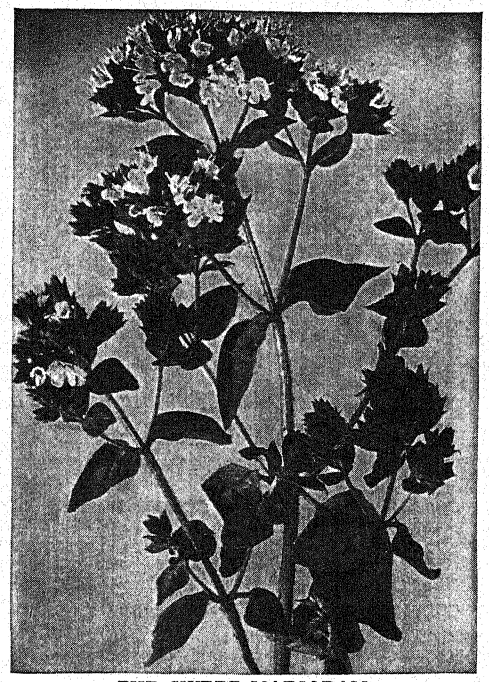
THE RED DEAD-NETTLE

This flower is no relation of the stinging-nettle, although the leaves of both are very much alike. The name dead-nettle was given because its foliage has no stinging power. This flower is also called archangel.



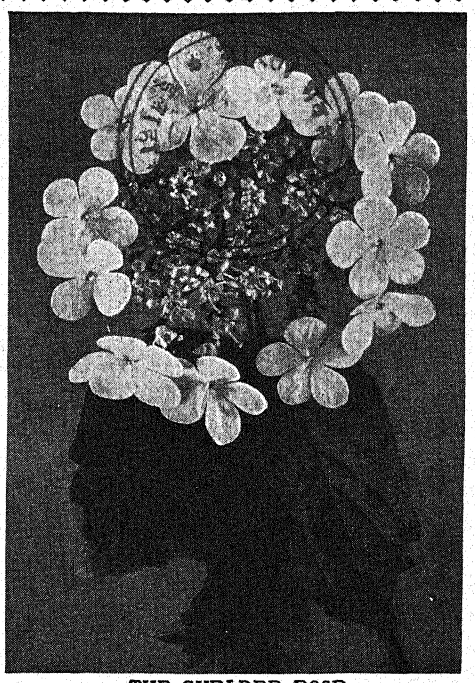
THE WHITE DEAD-NETTLE

This flower is very much like the red dead-nettle, but is larger in all its parts. It is stingless, and blossoms from spring to autumn. The dead-nettle is not eaten by animals when it is with the stinging-nettle.



THE SWEET MARJORAM

This is one of our kitchen herbs, and an oil from it is used to relieve toothache. The plant is fragrant, and the light purple flowers growing in thick clusters at the ends of the stalks add charm to its native downs.



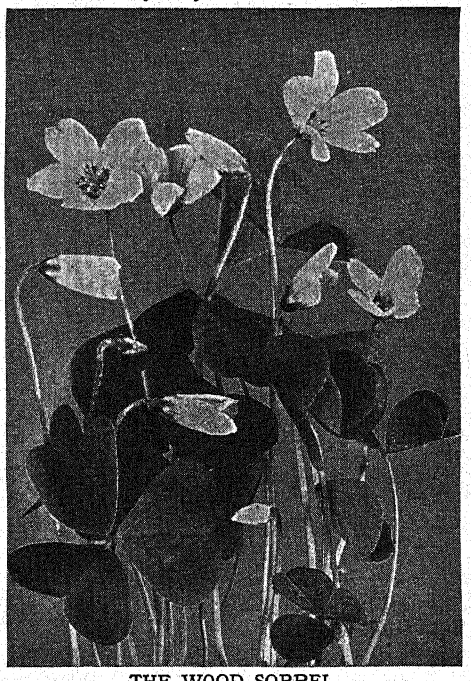
THE GUELDER ROSE

This belongs to the honeysuckle family, to which the elder-tree also belongs; in fact, another name for the guelder rose is water-elder. It is also called the May rose and the tisty-tosty. The flowers are snow-white.



THE GROUND-IVY

The ground-ivy, which is one of our earliest spring flowers, is no relation to the real ivy. It used to be called ale-hoof, and was much used in brewing. It is also called Gill-run-over-the-ground.



THE WOOD SORREL

The charming wood sorrel, with its white pink-streaked flowers, is often called the hallelujah, because it blossoms at Easter. The wood sorrel is thought by some to be the original shamrock of St. Patrick.

up a continuous display well into the autumn.

THE BRIGHT BLUE CORNFLOWER OR BACHELOR'S BUTTON

Another common garden flower is that composite of many names, such as bachelor's button, bluebottle and cornflower, but Americans must always remember that corn to the Englishman does not mean maize, or Indian corn, but grain, especially wheat. The round base of the flower-head, covered or protected by broad scales, somewhat suggests a thistle, but it has very conspicuous rays. The inner flowers are purple and tubular, but the outer florets are like trumpets with jagged brims. The flowerets in the cornflower have divided their duties. The brilliant azure of the large flaring flowers on the outer circle of the flowering heads serves only to attract insects, for they are without pistil or anthers. The fruitful ones are the insignificant purplish ones within the centre. These have both pistil and stamens, the latter united into a ring about the flower, poised on slender filaments. They exude pollen until the tube of the flower is quite filled, for the attraction of insects.

THE STINGING-NETTLE HAS COME FROM THE OLD WORLD

Many a child, whose bare limbs are scarlet and prickling, rues the day when the stinging-nettle first extended its travels from the Old World to the New. It does not in the least interest that child, at that moment, to know that hemp-fibres, woven into the ropes he plays with, have been extracted from a plant of the same family. The stings are inflicted by the peculiar weapons borne by the nettle for warding off plant-eating animals. Each hair is expanded at the base and at the top is swollen into a little round cap bent to one side. At this bent portion the walls are very thin, and the head is broken off at the slightest touch, leaving a sharp point that penetrates the skin, and by means of which the irritating contents of the hair are forced into the wound. Oddly enough an acid possessed by ants, and which helps to make a bite of that insect burn, is present in these nettle-hairs. These hairs irritate the membranes of the mouth and nose of browsing beasts, and they carefully avoid the plant.

Among the nettles may grow the dead-nettles that are members of the mint family and therefore are not nettles at all, but have been so called because the leaves of the white ones are very much like those of the stinging-nettle. As these do not sting they are called dead-nettles, or in some places dumb-nettles.

THE WHITE DEAD-NETTLE HAS NO STING

Most frequently we shall find the white dead-nettle growing against, or among, a clump of stinging-nettles, and then we shall notice how much the leaves of the two plants are alike. The dumb animals, dreading lest they be stung by the real nettles, and evidently observant of the general appearance of a nettle-plant, carefully avoid all other plants of like appearance. Consequently the dead-nettle is left uneaten and is able to ripen its seeds in safety, especially when in company with the stinging-nettles. This is a form of self-defence obtained by a likeness to a dangerous plant—protective mimicry it is called.

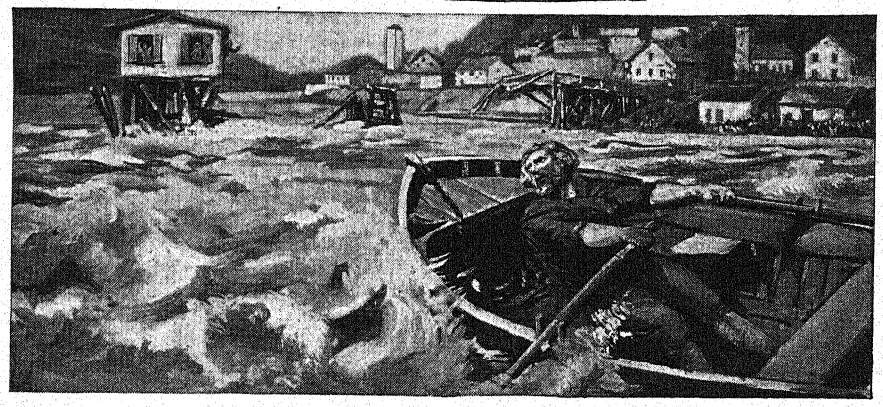
GROUND-IVY, OR GILL-RUN-OVER-THE-GROUND

The ground-ivy, another scentless mint, has earned for itself the name of Gill-run-over-the-ground; a kind of name that reminds one of Creeping Jenny or Wandering Jew. These names have been earned by the plant's habit of traveling over the ground by means of long runners. We often see the ground-ivy along damp banks, or in shady thickets, as it creeps under the hedgerows of England whence it came, forming carpets of furry, nearly-round and evenly-toothed foliage, and holding up little clusters of blue-purple flowers very early in spring. It also has smaller flowers containing only a pistil.

THE PRETTY BLUE FLOWER-SPRAYS OF THE GERMANDER SPEEDWELL

Upon sunny banks in early summer we are sure to find the germander speedwell, or bird's-eye. The bright blue blossoms in the axils of the upper sessile leaves, have a short tube to the corolla. Of the four lobes that represent the petals, only two are of the same size. All are marked with fine lines of darker blue, leading to the mouth of the tube, and to guide the flies that carry the pollen, each is margined with white. The stamens bend downwards and inwards, to insure pollination.

THE NEXT NATURE STORY IS ON PAGE 4473.



THE PEASANT AT THE FLOOD

CONTINUED FROM 4192

MORE than a century ago terrible floods were experienced in the neighborhood of Verona, owing to heavy falls of snow in the Italian Alps, followed by a rapid thaw. To-day, the farmers have learned by skilful engineering to make use of the surplus water for their crops. Then, the rivers came dashing and roaring down from the mountain-sides, overflowing their banks and carrying everything before them. Among other disasters a bridge over the River Adige was carried away, all except the middle part, on which was built the house of the toll-gatherer, and he and his family were thus left on a kind of timber island that might at any moment be swept away by the raging torrent.

The man with his wife and children appeared at the windows of their house, waving their arms frantically for help, and screaming to the onlookers in the distance to rescue them from their peril. But although there were many on the banks anxious to help the stranded family, none dared to venture upon the surging waters.

The Count of Pulverini, a nobleman of the district, came upon the scene and offered a reward of fifty pounds to anyone who would try to rescue the family, but no one would undertake the dangerous task.

At this moment a peasant, travelling from another part of the country, came to the spot, and immediately jumped into a boat, and began to pull out towards the bridge-house. But the current was swift, and only by almost superhuman effort was he ultimately able to bring the boat alongside the broken piers of the bridge on which the house stood.

"Courage, my friends!" he shouted to the endangered family, and inspired by his confidence they climbed down into the boat.

Then came the return journey, which was even more dangerous than when the peasant first set out, for now he had a boat-load of passengers; but his strength was great, and his courage and determination were greater still, and at last he landed all safely on the banks.

The crowd broke out into a loud cheer, and the count came forward, holding out his purse by way of recompense; but the peasant, whose name has not come down to us, declined the reward, saying:

"I should certainly not expose my life for money. I can work for all I need to meet the wants of my wife and children. Give the money to those poor people who have lost all."

And so the brave man not only rescued the family, but by his generosity was able to supply them with sufficient money to buy a new home.

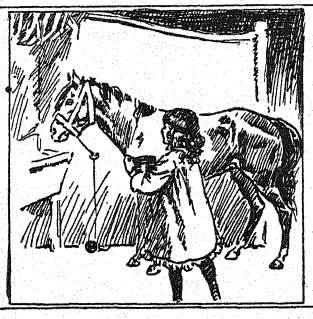
LITTLE PICTURE-STORIES IN FRENCH

First line: French. Second line: English words. Third line: As we say it in English.

Marjorie avait un poney qui s'appelait Jean, à qui elle donnait à manger
Marjorie had a pony which itself called Jack, to which she gave to eat.
Marjorie had a pony called Jack, whom she used to feed.

Un jour que Marjorie courut à l'écurie elle trouva la porte grande ouverte
One day that Marjorie ran to the stable she found the door wide open.
One day when Marjorie ran to the stable she found the door wide open.

Elle regarda dans l'écurie, mais Jean n'y était plus. Où était-il parti ?
She looked into the stable, but Jack not there was more. Where was he departed ?
She looked into the stable, but Jack was not there. Where had he gone ?


Marjorie courut dehors dans tout le sentier pour le chercher.
Marjorie ran outside into all the lane for him to look for.
Marjorie ran out and searched the lane for him.

Jean était là, et il y avait un pauvre petit garçon assis sur son dos.
Jack was there, and it there had a poor little boy seated upon his back.
There stood Jack, and sitting on his back was a poor little boy.

" Mauvais garçon d'avoir volé mon poney," dit-elle. " Autrefois il était à moi.
" Bad boy of to have stolen my pony," said she. " Formerly he was to me.
" You bad boy to steal my pony," said she. " He was mine once.

Quand nous sommes devenus pauvres mon père vous l'a vendu," dit le garçon.
When we are become poor my father to you him has sold," said the boy.
When we became poor my father sold him to you," said the boy.

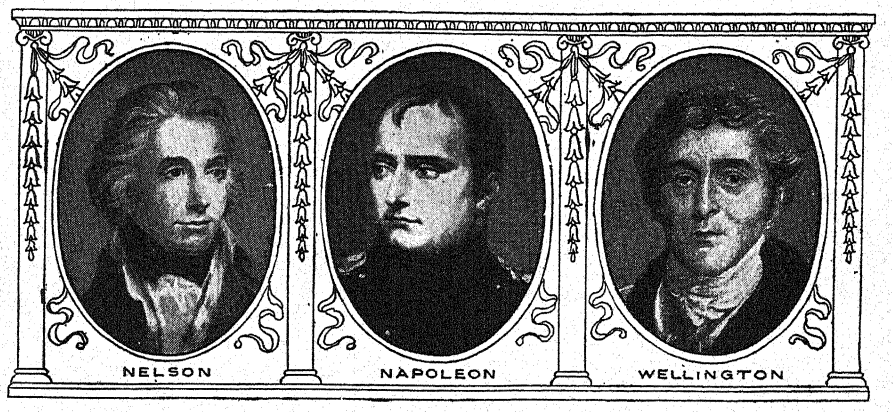




" Et j'étais si heureux de le revoir que j'ai sauté sur son dos."
" And I was so happy of him to see again that I have jumped upon his back."
" And I was so happy to see him again that I just jumped upon his back."

" Pauvre garçon," répondit Marjorie, " je vous le prêterai quelquefois."
" Poor boy," replied Marjorie, " I to you him will lend sometimes."
" Poor boy," replied Marjorie, " I will lend him to you sometimes."

" Merci bien ! " Le petit garçon courut chez lui heureux comme un roi.
" Thanks well ! " The little boy ran to the house of him happy as a king.
" Oh, thank you ! " And the little boy ran home as happy as a king.



NELSON, WELLINGTON, NAPOLEON

THREE MEN WHO CHANGED THE WORLD

CONTINUED FROM 4254

ABOUT a century and a half ago, a baby was born at Ajaccio, on the island of Corsica, in the Mediterranean Sea, who was destined, as the saying goes, to turn the world upside down. His family name was Buonaparte, an Italian name, though when he became famous he changed the spelling to the French form Bonaparte. His Christian name was Napoleon.

It is interesting to remember that Napoleon, one of the most famous of French rulers, would not have been a French citizen by birth if he had been born even a year earlier. Corsica had for a long time belonged to the Republic of Genoa. But the Corsicans were much dissatisfied with the treatment which they received from Genoa. They constantly broke out in rebellion against the Genoese, and at one time the revolutionists asked the Government of England to go to their aid. England, however, refused to take them under her protection. In 1768, Genoa, realizing that she could not control the island, sold all her rights over it to France. Since that time, Corsica has been a French possession, and the Corsicans are so proud that the great emperor belonged to them that they have become patriotic Frenchmen.

When he was old enough, Bonaparte was sent to school at Brienne in France. The young Corsican, with his Italian blood, did not get on very well with the French boys, who little thought he would afterwards become a national hero to the French. But he succeeded with his studies, and was particularly fond of two subjects—mathematics, which are very necessary to make anyone a master of one part of the art of war; and the history of the great conquerors, and how they were victorious in their wars, so that he learned the secret of their successes. He spent four years at Brienne, and from there went to the military school at Paris.

It was just about the time when the French Revolution was beginning that the little, thin, olive-skinned Corsican became a lieutenant in the artillery. When the French had cut off their king's head, and declared war against all the crowned monarchs of Europe, the Royalists, who would not obey the Republicans and Robespierre, got possession of the harbor of Toulon, and Spanish and British ships went to help them.

The Republicans sent an army to

besiege Toulon, and a clever plan of the youthful Bonaparte, who had already been made a captain of artillery, enabled them to capture it, and then it was no longer possible for British and Spanish ships to stay in the harbor. But young Bonaparte soon got into trouble, in spite of what he had done, because he had made friends with Robespierre's brother; and when Robespierre was overthrown, the people who had been his friends were held in suspicion by the new Government.

Although Bonaparte was only twenty-five, he had found out by this time that he understood more about managing armies than most other people; yet he thought there was so little chance of his rising to hold a high command in the French army that he wanted to go away to Turkey and help the Sultan to make a great army there. However, he got his chance after all, for the Directors, as we read on page 2286, were afraid of losing their power; and one of them, named Barras, thought that if he had that clever young artillery officer on his side, they would soon be able to overcome all resistance that might be offered to them.

That is how Bonaparte got command of the troops, and crushed the revolt against the Directory in Paris. He did it so cleverly that the great War Minister, Carnot, saw that he was fit to hold the very highest commands, young as he was. The Directory wanted a general whom they could use to prevent anyone else from upsetting them, but they did not imagine that their own general would become their master. So, as the French wanted to drive the Austrians out of their possessions in the north of Italy, and Bonaparte had made a very skilful plan for doing it, he was sent off to command the army in Italy.



BONAPARTE AT THE MILITARY SCHOOL AT BRIENNE, TO WHICH HE WENT AT TEN YEARS OLD

Before he went he had just time to marry Joséphine de Beauharnais, a lady with whom he had fallen violently in love. A week later he was well on his way to the war, and then he began to win victory after victory in a way which astonished everyone. For when Bonaparte was in command, the soldiers soon learned that they could do things which everyone else supposed to be impossible. It is easy for a man to walk twenty miles in a day. But it is very difficult to march several thousand men with all

NELSON ABOUT TO JOIN HIS FIRST SHIP

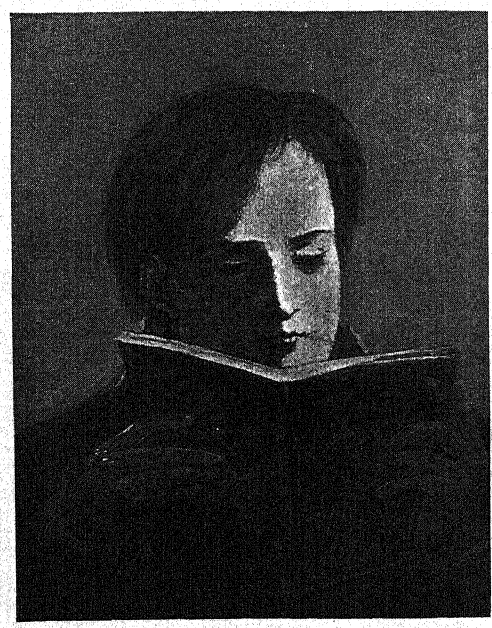


When Nelson was only twelve years old, his father wrote to an uncle, who commanded a war vessel, to ask if the boy might join the ship. "What," replied the uncle, "has poor Horatio done, who is so weak, that he, above all the rest, should be sent to rough it out at sea? But let him come, and the first time we go into action a cannon-ball may knock off his head, and provide for him at once." It was not a promising introduction to naval life, but Nelson grasped the opportunity of becoming a sailor, and here the artist, Mr. George W. Joy, shows us the boy bidding good-bye to his grandmother before setting off for his first ship.

their stores, supplies and artillery over that distance, and to do it day after day. This is what Napoleon did.

Bonaparte was so skilful in moving great masses of men swiftly over a great deal of ground that he appeared again and again before the enemy, ready to attack them before they could occupy strong positions; and so, though the Austrian armies were much larger than his, he was able to hurl his whole force against one part of the enemy, and beat them utterly before the rest could come to their help.

Besides that, soldiers are usually ready to follow anywhere a leader who is perfectly fearless himself, and so, in a few months, Bonaparte had driven the Austrians out of Italy. He crossed the Alps which divide Italy from Austria, and was marching upon Vienna, the Austrian capital, when the Austrians offered to make terms with the victor.



NAPOLEON WHEN A BOY
From a sketch by M. Girodet, by permission of Messrs. McClure.

Bonaparte had not been inclined to do whatever the Directory in Paris told him; now they began to be nervous about what he might do next. So they were very well pleased when he proposed to conduct an army to Egypt and take possession of it in order to strike at the British in India. They thought it would be just as well to keep such a popular and brilliant and self-willed soldier out of the way. But Bonaparte meant to conquer Egypt and Western Asia, and then with a mighty army at his back, to turn and make himself master of all Europe.

Now let us look at the man who was able to spoil that plan of Bonaparte's, and who, before he died, made England safe against all the great Corsican's schemes. For we must know that Bonaparte saw there was no power in the world which stood in the way of his ambitions so much as the British, and he was bent, above everything, on ruining that power.

Nearly eleven years before the birth of Bonaparte, Horatio Nelson was born in a country vicarage called Burnham Thorpe. He was a delicate little boy, but just as plucky and fearless as could be, and he was quite determined to go to sea; so he was allowed to do so, though everybody thought the life would be so hard that it would be sure to kill him. But he was not the kind of boy to get killed in that way.

On one of his first voyages he went to the Arctic regions, and what must he do but go out with another midshipman to try and kill a Polar bear. It was lucky that some more of his shipmates came along, for young Nelson had found his bear, and they saw the bear, which he had wounded but not killed, making for Nelson, and Nelson making for the bear with the muzzle of his musket instead of running away. Happily a good shot from one of their guns finished the bear, or there might have been no battle of the Nile and no Trafalgar. But the story shows the boy's mettle. Now, when France and Great Britain were at war, the thing that mattered most to the latter, as it was an island, was that its navy should be stronger than any other, so that it could send its ships wherever it chose and keep its enemies from crossing the seas. The first famous thing that Nelson did was achieved just about the time that Bonaparte was so successful in Italy. The Spaniards had allied themselves with the French and their fleet and the French fleet together were larger than the British fleet.

When Admiral Jervis saw an opportunity of attacking and destroying part of a large Spanish fleet before the ships which were separated from the main

NELSON IN TRIUMPH AND IN DEATH



Few naval victories have been so complete as Nelson's triumph over the French at the battle of the Nile. With fewer vessels than the enemy, he crept down the French line and destroyed almost their whole fleet. When he returned, he landed at Yarmouth, as shown in this picture by Frederick Roe, and was received with wild enthusiasm. Bonfires were lighted, and his journey to London was a great triumphal progress.



Great as was the victory of the Nile, the supreme triumph in England's naval history was the battle of Trafalgar, which gave to Britain, for more than a century, the mastery of the seas. But the joy of the nation was turned to mourning in the hour of victory by the death of its hero. Here we see the last moments of Nelson in the cockpit of his flagship, the Victory, after he heard of the defeat of the French and Spanish fleets.

body could come to its help, he seized the opportunity and won the great battle of St. Vincent. Yet he might not have won so great a victory if Commodore Nelson had not seen that if he attacked the rest of the Spanish fleet he could prevent it from coming up to help the other ships, or escaping from the British altogether. And although Admiral Jervis had given different orders, he was very much pleased with Nelson for acting as he did; so, very soon after, Nelson was raised to be a rear-admiral.

Now, not long afterward, Bonaparte wanted to sail to Egypt with his great army, and Nelson was lying in wait to prevent him sailing from Toulon. But Nelson had to put into port to repair his flagship, and Bonaparte put to sea. Nelson's ships were soon pursuing him, but passed him by in a fog without knowing it, and so went hunting after him in another direction. Thus Bonaparte got to Egypt, and landed his army and conquered the country, as we read on page 2286. But while he was there Nelson found the best part of the French navy at anchor in Aboukir Bay; and, having the wind behind him, he sailed with his smaller fleet half-way down the French line, with half his ships on one side of them, and half on the other, so that he got them between two fires; and all that evening and half the night the battle raged, and in the morning all but two of the French ships had either been taken or sunk. That was the great battle of the Nile, for which Nelson was made a peer. After that it was not easy for French ships to appear in the Mediterranean Sea at all, and Bonaparte, in Egypt, could get no more men or money or stores from France, so that he could not set about the great conquests of which he had dreamed, or bring his army back to Europe. Still, after a time he found a ship which took him back to France with a very few of his friends; and then he had himself made First Consul, which really meant that he was the absolute ruler of France. He succeeded in doing that because the soldiers were on his side, for the National Assembly did not at all like to give up its power. Things had not been going well with the French while Bonaparte was in Egypt. The Austrians were back in Italy, and he had to hurry off, taking an army, by a wonderful and very difficult march, over a great pass in the Alps, so as to appear when the Austrians did not expect him. He beat them again in Italy, and another general, Moreau, won the great battle of Hohenlinden. After that the Austrians sought peace once more.



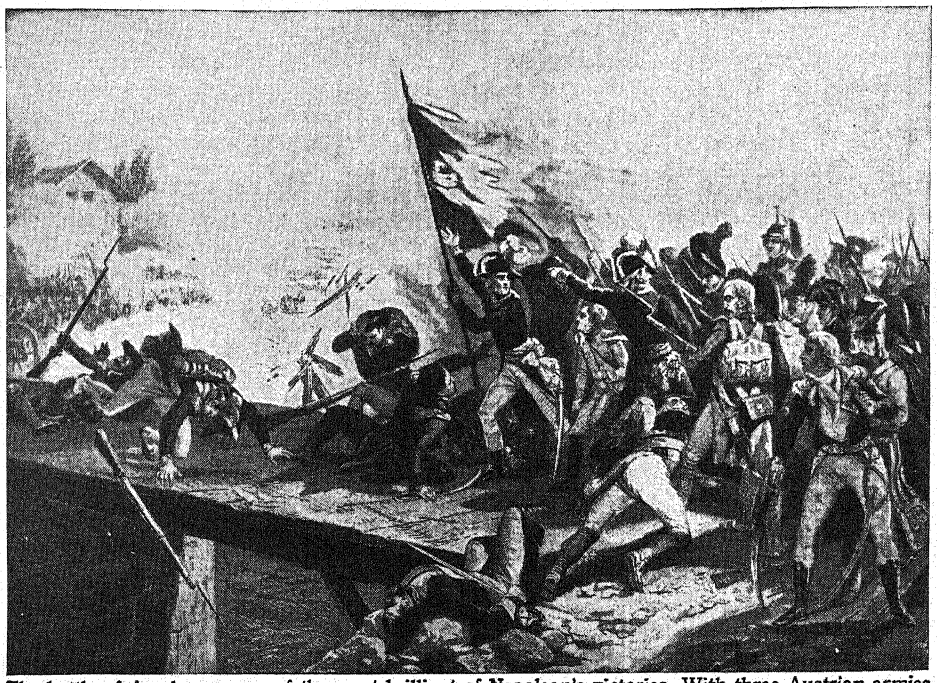
NELSON AS A MIDSHIPMAN

But before there was real peace Nelson had to be at work again; for Bonaparte wanted to get the Danes to let France use their fleet against England. So Nelson was sent to the Baltic to get the Danish fleet handed over to him instead. There was another admiral, named Parker, over him, but it was Nelson who fought the battle of the Baltic, which made the Danes submit. The victory put an end to that plan of Bonaparte's, and after the Danes were defeated there was peace even between Great Britain and France for a little while.

For some time Bonaparte had taken to signing his Christian name, as kings do, instead of his surname, and in December 1804 had had himself made Emperor of the French. We must remember that he was not only one of the very greatest soldiers that ever lived, but was also a great ruler, and he did many good things for France during the time of peace. But he could not be content while England still ruled the seas and would not do his bidding; so it was not long before war was declared again.

Napoleon made a plan for a great invasion of England, but though England had no great armies to match his on land, he had no fleet to match hers on sea, and there was no way of sending his soldiers across the Channel so long as the British fleet was on guard. Then it was that Nelson won his last and greatest victory. The French admiral, Villeneuve, with a French and Spanish fleet, played a sort of hide-and-seek with him, sailing off to

NAPOLEON & WELLINGTON ON THE FIELD



The battle of Arcola was one of the most brilliant of Napoleon's victories. With three Austrian armies approaching him, he made a daring night march, and attacked them on swampy ground where cavalry could not charge. After three days' fighting, the French were victorious. During the battle Napoleon nearly lost his life. Seizing a flag, he rushed on to a bridge to rally his men, and was pushed into the river.



After the defeat of Napoleon's army at Waterloo was assured, and the Prussians, in hot pursuit of the French, had turned their retreat into a rout, the Duke of Wellington and the Prussian general, Blucher, met on the battlefield, and congratulated one another upon the victory that had been won, as shown in this picture by Daniel Maclise. The brunt of the battle had been borne by the British, who were tired out, and Blucher's arrival put an end to any hope that Napoleon might have had of rallying his shattered forces.

the West Indies, and then doubling back, in an effort to gain time to join forces with another French fleet, and so be able to command the Channel long enough for Napoleon to get his invading army across. But he did not succeed in joining the other fleet.

Then Napoleon saw there was no hope of invading England, and carried off his army from Boulogne to win the great battle of Austerlitz. Nelson went after Villeneuve; and after he had followed him across the Atlantic and back, he found him with a great fleet, part French and part Spanish, at Trafalgar. Nelson's ships sailed down on Villeneuve's line, pierced it in two places, and treated it very much as the other fleet had been treated at the battle of the Nile.

This was the day on which Nelson ran up his famous signal, "England expects every man to do his duty," and set a glorious example which was gloriously followed. But before the victory was complete, which ended all hope of France resisting England on the seas, the hero himself had fallen, pierced by a bullet. He lived just long enough to know that his great task was successfully accomplished. So died one of the greatest sailors in history.

HOW NAPOLEON TRIED TO RUIN ENGLAND AND BECOME MASTER OF THE WORLD

Now, Napoleon knew that it was not by fighting battles that he would ever have the chance of humbling England, but he thought he could ruin her by preventing her from either selling or buying anything in Europe; and that was one reason why he wanted all Europe to bow to his will, besides the wish to make himself the mightiest emperor the world had ever seen. He made his own brothers kings in Holland and in Italy and in part of Germany—kings who would really be his subjects; and at last made one of them, named Joseph, King of Spain.

This, in part, was his undoing; for the Spanish people would not have a Bonaparte for their king, and rose up against him. The British sent an army to help them, and at their head was the great soldier who finally broke Napoleon's power in the last great fight of Waterloo. The strange thing is that Napoleon did not go himself to Spain to crush Wellington, but left the work to his marshals, whom Wellington out-generalled. But he himself thought it more necessary to make Russia obey him, when she was the only remaining country in Europe which did not fear him. That is why he went on that terrible expedition to Moscow, whence the lack of food and shelter forced him to retreat through the bitter winter weather, so that only a shattered remnant of his army ever returned home.

THE IRON DUKE, WHO BROKE THE POWER OF BONAPARTE

The Duke of Wellington was only Sir Arthur Wellesley when he went to command the British army which was to help the Portuguese and Spaniards. He was born in the same year as Napoleon, and was exactly forty years old when he took up the Spanish command. He was a younger brother of an Irish peer, Lord Mornington, who was sent out to be Governor-General of India, and who afterwards became the Marquis Wellesley.

Arthur Wellesley went to India, too, and fought in the great wars there, first against Tippu Sahib of Mysore, and afterwards in command of British troops and sepoys against the Maharattas, when he won the famous battle of Assaye. For this great victory he was made a knight.

In after years men called him the Iron Duke. Let us look at his fine, firm face, with the great nose and the strong mouth: a man who could never be shaken out of his stern self-control. Long years after, men must have been moved as they saw the Iron Duke, now white-headed, break down and shed tears in addressing the House of Lords on the death of his noble friend, Sir Robert Peel. Hard and cold he seemed, but altogether just, and with never a hint of self-seeking.

HOW WELLINGTON BEAT BACK ARMY AFTER ARMY IN MANY FAMOUS FIGHTS

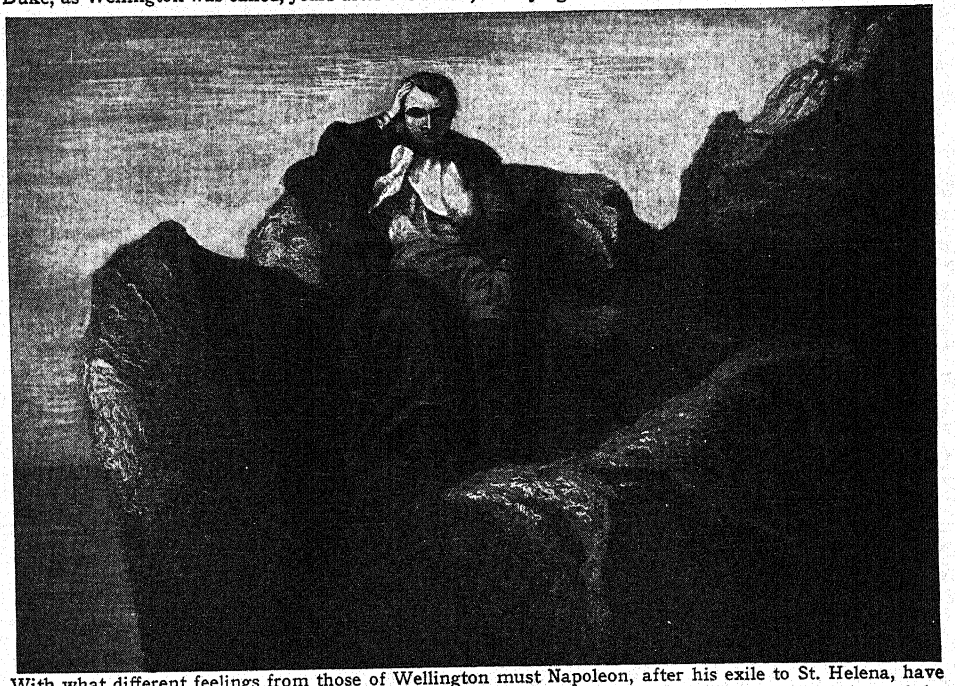
It was no easy task that he had in what is called the Peninsular War, when Napoleon's most skilled marshals came to fight him, one after another—Victor, and Masséna, and Marmont, and Jourdan, and Soult; when he could trust nothing to the Spanish soldiery, but had to depend for all real work on his own men; when one defeat would almost certainly have led to his recall.

Year by year he fought his campaigns, and beat off army after army in his famous fights at Talavera, Albuera,

FIGHTING THEIR BATTLES OVER AGAIN



The battle of Waterloo will always be known as one of the turning-points in the world's history. Here the power of Napoleon, the man who had changed the map of Europe, was for ever broken. And whenever Waterloo is spoken of, Wellington, the victor of Waterloo, will also be remembered. Here we see the Iron Duke, as Wellington was called, years after the battle, surveying the field of his victory that saved Europe.



With what different feelings from those of Wellington must Napoleon, after his exile to St. Helena, have recalled the mighty battle that sent him to his doom! Away in his rocky island home, guarded beyond the possibility of escape, he must often have sat on the lonely crag, as shown here, fighting the battle over again, correcting the blunders that led to his defeat, and wishing that the past was not beyond recall.

Fuentes d'Onoro, and Salamanca, until at last he sent King Joseph Bonaparte flying from Spain after the rout of Vittoria, and fought his way into the south of France, just when all the armies of Europe were closing in upon Napoleon, whose power had been all but destroyed in the fierce three days' battle of Leipzig, which men called the Battle of the Nations.

THE MIGHTY EMPEROR WHO BECAME THE KING OF A LITTLE ISLAND

The great conqueror had been conquered. He had cast aside his wife, Joséphine, that he might wed an Austrian princess; then he had suffered the awful disaster of Moscow; once more he had hurled himself against the combined Powers of Europe, and, in spite of a victory at Dresden, had been overwhelmed by their numbers at Leipzig. The lion was meshed in the toils; but the Powers of Europe suffered him to abdicate his imperial throne, and retire to the little island of Elba, in the Mediterranean.

A twelvemonth had not passed before the world was startled by his reappearance in France. His old soldiers flocked to his standard; they were sent forth to crush him, but instead they joined his army—and the only nations that were at all ready to face him were the British and the Prussians. Both of these peoples were able quickly to place armies in Belgium or on its border, Wellington commanding the one, and stout old Blücher, whom folk called "Marshal Forwards," the other. If Napoleon could only crush them before Russia and Austria could take the field against him, he might once again be master of Europe.

HOW NAPOLEON FELL FOR EVER AND WAS BANISHED TO A LONELY ROCK

Napoleon tried his hardest to overthrow the armies of Britain and Germany, and he very nearly succeeded. He struck at a point just between Wellington and Blücher, and beat the Prussians in a battle at Ligny, while the British stood at bay at Quatre Bras. Now, the question was whether he could keep Blücher and Wellington apart till he had beaten Wellington. The "Sepoy General" took up his stand at Waterloo, and all day, throughout Sunday, June 18, Napoleon drove the masses of his troops up the slopes against the British lines, and all day the British drove them back, time after time.

At last, as Blücher and his Prussians began to arrive on the field, the French made their last desperate charge, and met their last desperate repulse. The British line swept forward, and the Prussians came thundering on their flank; the defeat became a rout, a wild flight: the army of Napoleon was shattered for ever.

When the fallen emperor yielded himself, none dared treat him generously; all feared him and distrusted him too much. He who had shaken the world with the stamp of his foot, and dazzled it with the flash of his sword, was banished to end his days on the lonely rock of St. Helena, far out in the mid-Atlantic Ocean. And in France the brother of the murdered monarch, Louis XVI., was restored to the throne to rule as king.

THE IRON DUKE, WHO SAVED FRANCE FROM THE VENGEANCE OF HER FOES

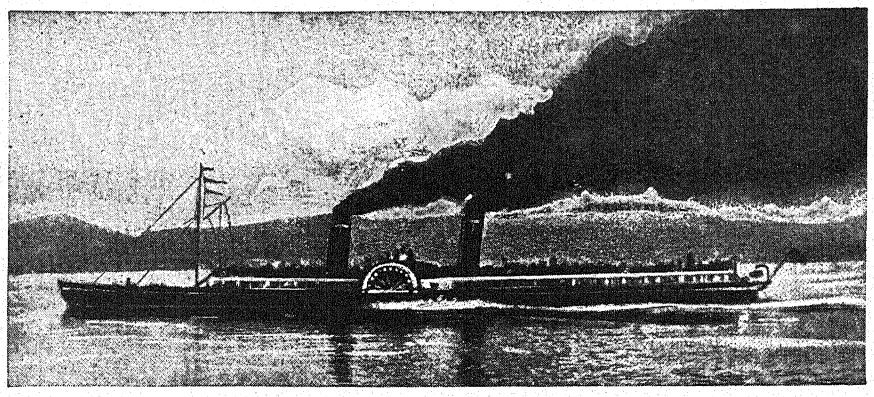
In those days the Iron Duke showed himself a wise and shrewd man, checking those who would have taken a fierce revenge on France for all the troubles Napoleon had wrought. But later he showed that even a wise man may have little understanding of the governing of a country like England, where, as in our own land, the people desire to have a voice in their own ruling.

Yet, for all that, he knew that there are times when the wise general will beat a retreat; and so, when the Tory party in Parliament came to look upon him as their chief, his most notable acts were just when he told them that they would do more harm than good by resisting changes on which he saw that the people were fully determined.

Waterloo had been fought and won nearly forty years before the great duke passed away, full of years and honors, loved by the British nation in his old age, as it had never loved him when all Europe was ready to do homage to the conqueror of Napoleon.

When he died in 1852, they laid him to rest, "to the noise of the mourning of a mighty nation," in St. Paul's Cathedral, and there they erected a splendid monument to his memory as a man who was one of the saviors of Europe.

THE NEXT MEN AND WOMEN BEGIN ON 4441.



WHERE DOES THE SMOKE GO?

CONTINUED FROM 4277



SMOKE is made up of a large number of different things, solid and gaseous. The solids are for the most part too large to stay in the air, and so, after a time, they settle. There is a lot of oil made when coal is burned, and so the black particles of carbon found in smoke are oily, and that is what helps to make them so dirty. Some of the gases are already quite burned when they pass off in smoke, such as carbon dioxide, and we know what happens to carbon dioxide in the air—whether it has come from our lungs or from a furnace that is not alive.

Other gases in smoke are not completely burned, and they get burned up in the air, forming more carbon dioxide, and also water, which is one of the things made by the burning of the hydrogen of coal, and is therefore always present in smoke.

ARE FLOWERS HURT WHEN WE PICK THEM?

It is very difficult to answer this question, not because we do not know the answer, but because it is not easy to use the ordinary words without giving a wrong notion of the facts. It all depends what the word hurt means; so much so that in one way we might certainly say No, and in another we might say Yes, to this question. We may be quite sure that the flower is not hurt as we are hurt by a pin-prick or a cut. The kind of feeling that we call pain is, in fact, a very high and lately developed and special kind of feeling. No plant of any kind feels pain. It is even certain that it is only among the higher types of animals that anything we may call pain can be felt; so there is no cruelty in picking a flower. But, on the other hand, we can be perfectly certain that some part of the plant feels the injury. What that feeling is like we could not say unless we could become a plant. That is largely true of all feelings: only those who feel them really know what they are like.

HOW DOES A FLOWER GROW?

All living things grow at some period or other in their lives, and the secret of growth is part of the secret of life itself, which men have not yet found out; so it is only possible to answer this question in part. We can say what are the conditions without which the flower is unable to grow. It must have light, water, air, and certain salts, containing certain elements, dissolved in the water which is sucked up by the roots. If these conditions are granted, the plant will obtain for itself the materials needed for building

itself up, and the energy employed in doing so. Not much could be said beyond this. All we know is that there is something in the life of the rose plant that determines that the flowers it bears must be roses and not lilies or wallflowers. Nor will any kind of outside change cause anything but a rose to be produced by the rose plant. The cells that contain the life of the plant are so made.

The same is true of every kind of animal and plant. Each has its own special structure, and will grow in its own special form. Exactly the same food may be given to the rose, to the lily, or to the acorn, and they will grow to be what they must; and exactly the same milk may be given to Marsie and to Marsie's kitten, to Tommy and to his puppy, and each will grow to be what its nature demands.

ARE LEAVES WATERPROOF?

The answer is both Yes and No, according to what we mean by waterproof. Usually that word means that a thing will not let water through it in either direction. That is true of waterproof clothes. But leaves and the skins of animals are only strictly waterproof in one direction. The skin or the surface of a leaf will allow no water to enter them. In both cases the body of the living creature is so arranged that the surface—whether leaf or skin—shall be the outgoing, not the incoming, channel for water.

If water could enter by this route, even after prolonged soaking, the whole arrangements for the circulation of water in the creature's body would be interfered with. When the surface of a leaf is carefully examined, we find that it has a sort of outer skin, really not so very different from ours. This is made of cells, the material of which has been changed, for this special purpose, into something which is very much the same as cork, and which water cannot penetrate from outside.

Rain is by no means bad for leaves, as it washes them and keeps them clean, thus keeping their surfaces clear for the purpose of breathing and for the use of the light that falls upon them. But the plant no more drinks by its leaves than we do by the skin; it drinks entirely by its roots. Water is able to leave the leaf, in the form of water-vapor, at various points, but water cannot enter there. Thus a leaf truly perspires, just as our skins do, and for the same purpose; and in certain states of the air, the water may become liquid, and lie in drops on the leaf. These drops look like dew, but are really the same as the drops on our skin when we have been running or taking any violent exercise.

WHAT IS THE MEANING OF THE NAME ENGLAND?

When we remember the origin of the name of England, we ought to know the celebrated story of Pope Gregory the Great, who, near the end of the sixth century A.D.—before he became Pope—saw some fair-haired English captives offered for sale in the slave-market in Rome. Their fair hair was, of course, very uncommon there, and looked very beautiful; and so he said: "Non Angli sed angeli," meaning "Not Angles but angels."

After the Romans left Britain, the island was invaded from the north by the Picts, and by the Scots. Both were Celtic people, but the Scots, who gave Scotland its name, had crossed over from Ireland some time before. On the south and east the island was invaded by three German tribes—the Jutes, Saxons, and Angles. Gradually the Saxons and Angles spread through the land as far as Wales on the west and north to the River Forth. The Angles settled in the east, and it was from this tribe that England received its name.

Though we still call the country England, the Angles form only a small fraction of the source of the English people to-day. The country gained, no doubt, in the long run, from all its invaders. In its people to-day there is represented not only English—in the strict sense—but also Saxon, Jutish, Danish, Celtic, Norman, Roman, and Scottish blood, to mention only its main elements.

WHY DOES WATER BOIL WHEN PUT ON LIME?

The answer to this question depends on a very interesting chemical process which is not difficult to understand. Water does not exactly boil when it is put on lime, but it is certainly true that the water is made very hot; and so our question really is: Where does this heat come from? Lime, or rather quicklime,

is a compound of the metal calcium and oxygen. It is therefore called calcium oxide, and each molecule that makes up this compound contains one atom of each of these elements; so chemists write it by this *formula* or sign—CaO—Ca standing for calcium and O for oxygen. If water reaches this oxide, the water and the oxide combine very powerfully. It is as if the quicklime drank up the water and slaked its thirst, and so we now call it slaked lime. This slaked lime is calcium oxide plus water, and its formula is simply the two formulas added together, CaO, H_2O. The best way of writing this is $Ca(OH)_2$. The small 2 means that there are two parts each of oxygen and hydrogen. As in most other cases of chemical action—just as when a fire burns—heat is produced by this slaking of lime, and that makes the lime and the extra water that is added very hot.

WHY DOES A CLOUD FALL AS RAIN INSTEAD OF IN A LUMP?

It is only quite lately that we have been able to learn the very remarkable answer to this question. We might suppose that, when the air cooled enough, the water-vapor, or some of the water-vapor, in it would be bound to turn liquid all in a mass and then fall "plump." But water cannot behave in this way, because there are certain conditions which must always be present when it turns liquid.

It is necessary that there shall be some solid separate point or particle of something around which the water-vapor can condense when it turns liquid. It seems to matter very little what the thing is, but there must be something, and the consequence is that rain falls in drops. It is the discovery of the cause of the formation of raindrops that enables us to answer this question. The particles that perform this service for the drops may be small or great. Oftenest, perhaps, they are visible specks of dust or dirt, and so on.

We have also discovered that the molecules making up the gases of the air are liable to be broken up in a peculiar way by the action of electricity, and raindrops can form upon these broken-up molecules. We shall not be able to learn a great deal more about the weather until we have more knowledge of the electrical happenings in the air.

DO WE GET A POUND OF ICE FROM A POUND OF WATER?

When we use such words as pound or ounce, we are concerning ourselves with the notion of weight; that is a different thing from mass, of course. The mass of a thing is the amount of stuff in it, and is just the same whether a thing is on the sun or the moon or the earth, though its weight would be very different in those three cases. Now, if we take a pound of water and turn it into ice, the mass of it will remain the same. We allow nothing to run away and we add nothing to it, so we have there the stuff which we had before, and nothing but that stuff; and the only question is: Does it weigh the same when it is frozen as when it was liquid? That, in other words, is the question asked here.

The answer is that most careful experiments have been made for many years past on this very point, and they all go to show very clearly that gravitation is not affected in the slightest degree by any change of temperature, however extreme. The amount of stuff which weighed a pound when it was liquid water weighs neither more nor less, but exactly the same, when it is frozen. If, however, instead of asking this question about weight, we had asked one concerning volume, or size, the answer would have been quite different. For instance, we do not get a quart of ice, so to speak, from a quart of water, because the water expands, as it is frozen, to form ice; and so we get more than a quart of ice from a quart of water.

WHY DO SOME COLORS APPEAR DIFFERENT IN GASLIGHT AND IN DAYLIGHT?

The color of anything that gives no light itself, but shines by reflecting, or throwing back, to the eye the light that falls upon it, depends on much more than the thing itself. Of course, the thing itself is very much to be reckoned with, but as it makes no light itself, it plainly can only reflect the whole or certain parts of the light that falls upon it. It is creating nothing—only giving back to our eyes a certain part of what falls upon it.

Whether in gaslight or in daylight, the thing itself is the same, but its color is liable to change if these two kinds of light are not the same. Let us suppose that a thing is able to reflect only a

certain pure shade of blue, and that that blue is found equally in gaslight and in daylight. Then the color of the thing will be the same in both cases. But in many respects gaslight and daylight are very different. Our eyes tell us at once that there is more yellow, for instance, in gaslight than in daylight. But that is only one of many differences. The color of a thing may be a mixture, because it sends back to the eye two kinds of light together. Then, if one of these kinds of light does not go to make up part of gaslight, or is only very weak in gaslight, we shall see the thing entirely or mainly by the other of the two colors that went to make up its daylight color—and so it may look very different.

All this depends, of course, upon the fact that daylight, gaslight, and, indeed, practically all the kinds of light that we ever use to see by or that are made in natural ways, are made up of a certain mixture or balance of light of many different colors; and the particular mixture varies in different cases. Even sunlight is by no means the same mixture of colors at all hours of the day.

WHY IS WHITE CLOTHING WORN IN SUMMER AND BLACK CLOTHING IN WINTER?

In the ordinary weather of the two seasons we wish to keep cool in summer and warm in winter, and so, as a rule, we wear cool clothing, as we call it, in summer, and warm in winter. We call clothes warm or cool according to whether they let the heat escape with ease or with difficulty from our bodies. This depends partly on the weight of the clothing, partly on its material, and partly on its texture.

But there is another way in which clothing may affect our temperature, quite apart from the question of how good or bad a conductor of heat it is. Exactly the same clothes will be cooler when white than when we have them dyed black. If we are to explain this, we must know what causes blackness and whiteness. A thing lit by white light is white because it returns to our eyes the whole, or nearly the whole, of the light that falls upon it. To a great extent it treats the rays of radiant heat that go with the light, and are really part of it, in the same way. But if it returns these things they will do little to it. Now, a black thing absorbs the light that falls upon it. Black is not a color, but the absence of any color, and a black thing is black because it does not send back from its surface the light that falls upon it. On the contrary, it absorbs this light, and also a great deal of the heat that comes with it.

The light that is absorbed disappears, but nothing is ever lost, and we must ask what becomes of it. The answer is that it is turned into heat—it is used up in warming the black coat that absorbs it. Thus in two ways the black thing is heated, and that is why we find it pleasanter for winter wear, while in summer we choose what will send back the heat and light.

WHAT CAUSES CREAM TO FORM ON MILK?

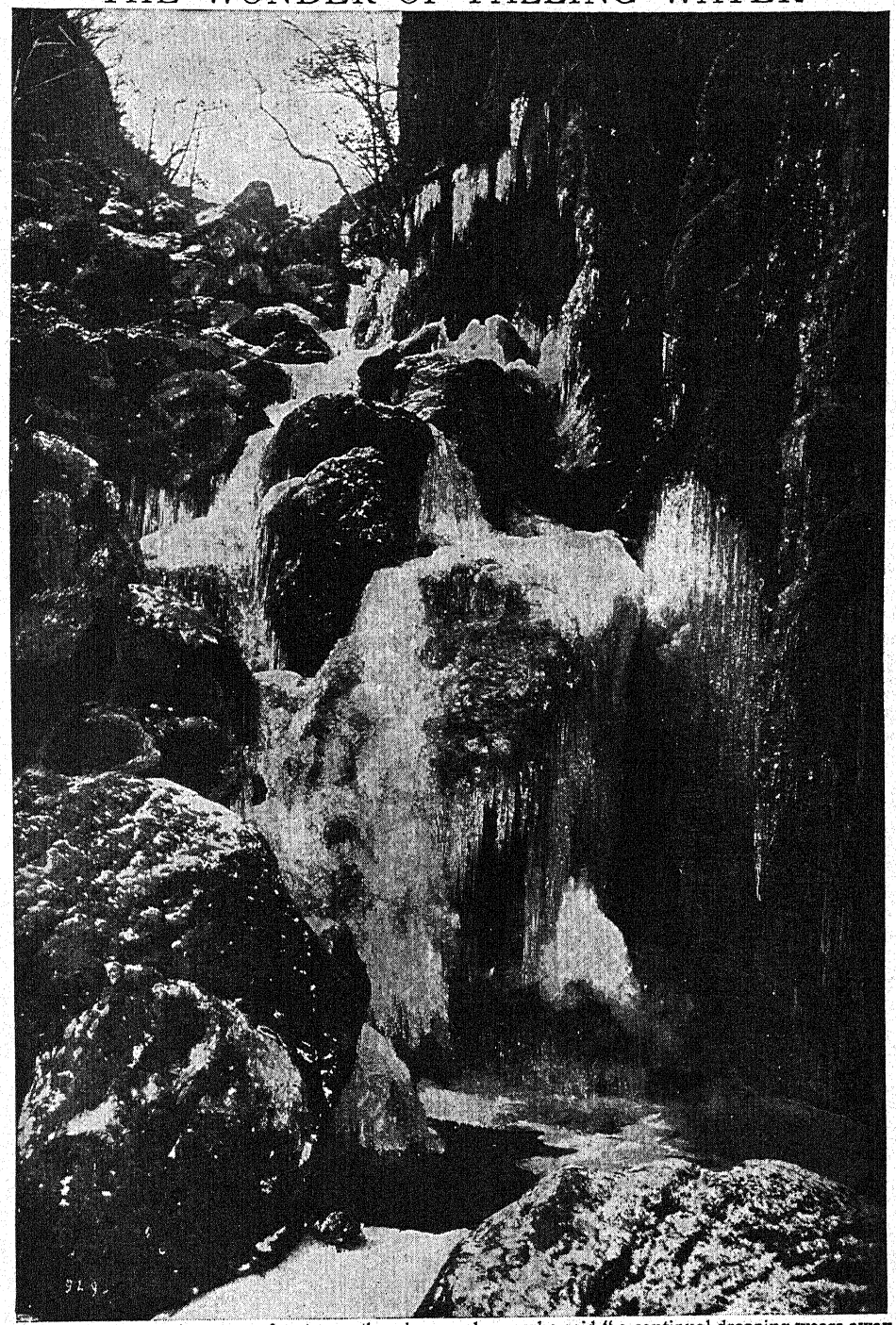
Cream is mainly made of the fat of milk, though we should always remember that it also contains a lot of the invaluable protein or albumin, too, caught between the particles of fat. For the fat in milk is not simply melted or dissolved in it, but consists of a vast number of tiny round balls of oil. The Latin word for a little globe is *globule*, and that is the proper name for these balls of oil.

When the milk is drawn, the oil globules are fairly equally distributed through it; but when the milk is allowed to stand, the principle of specific gravity, which we read about on page 3826, comes into play, and the oil, being lighter than water, of which milk mainly consists, slowly rises to the top. If milk were pure water, the oil would rise at once; but milk contains protein and other things dissolved in it, which retard the natural process of cream formation.

DO MICROBES HELP TO MAKE CREAM?

Nowadays we are usually in a hurry, and cream is therefore very often got from milk artificially by the use of what is called a *separator*. This method is more thorough, as well as quicker. But we have lately learned that there is a good deal more than this going on in cream. The making and what is called the "ripening" of cream depends very much upon microbes—not nasty but friendly ones—which naturally live in milk. Different kinds of microbes differ in their effect on the cream, and that is largely the reason why cream varies so

THE WONDER OF FALLING WATER



Nothing can resist the power of water, as the wise man knew who said " a continual dropping wears away stone." Slowly but surely the stream carves a passage for itself, and, in doing so, often causes the rock on the river to put on a fantastic appearance. If we look on the left of this picture we shall see what is something like the head of a white stag. It is this curious form taken by the water as it flows over the rocks that has given the name of the Stag Waterfall to this beauty spot in the Lake District, England. The poet Wordsworth, who has immortalized this waterfall, lived at Rydal, and wrote many poems about the place.

much as it does. In Germany places have already been established where the best kinds of microbes for this purpose are grown, and can be sent by mail to the farmer for preparing his cream.

WHY ARE ANY COINS MADE OF GOLD?

There are many fairly good reasons why some coins should be made of gold. If a nation is to have a coinage made of a metal that is precious, gold is perhaps the best that can be employed. It is not too common; but, at the same time, enough of it can be obtained to meet this purpose. It has a very easily recognized appearance, and yellow mixtures of other metals can scarcely be confused with it, especially as it is so very heavy. It does not rust, and tarnishes hardly at all when it is exposed to air or moisture. It has the defect of being soft, so that pure gold coins would get rubbed away; but the addition of other metals to it makes it quite hard enough to wear for a very long time.

But at the present time it seems that we shall some day cease to use gold for this purpose. For one thing, it can be shown that the more civilized nations become, the less do they employ in their business anything that is of value in itself. In old days people used cattle and the like for their money, as our word *pecuniary*—which really means cattle-ish—tells us. But the tendency at present is towards using something that shall be simply a sign, like checks and bank-notes. One advantage of this is that we shall be able to use gold, which is very beautiful, much more freely than at present, to make beautiful things.

WILL THE MOON EVER FALL INTO THE EARTH?

This is a good instance of those many great questions in astronomy which we can answer in a way and up to a point, but not yet with certainty. The reason is that the answer to such questions depends upon the various forces that are at work in the world. If we were certain in any case that we knew all these forces, then we could be certain as to what would happen, for we know the laws of their working, and these laws are certain and never change. But, in fact, we usually know only some of the forces that are at work, and so we must be careful, because we never know whether there may not be others which ought to be reckoned with. However, judging by the forces that we do know, we are bound to suppose that some day the moon will return to the earth, which it left so many millions of years ago.

This belief largely depends upon the study of the effects of the tides which the various bodies of the solar system raise in and upon each other. The question has been much studied by astronomers, and especially by Sir George Darwin, who was a son of Charles Darwin, who taught us the history of the plants, animals, and man. We do not yet know all there is to know about the history of the moon, however, though we are practically certain that at the present time the moon is slowly traveling farther away from the earth instead of getting any nearer. But, so far as we can judge, in time it is bound to come back again.

CAN A MICROSCOPE SHOW US THE ATOMS MOVING IN WOOD?

The answer to this question is: Certainly not; but the question is well worth asking, because it serves to clear up a point that is often not understood. We are perfectly sure that if we could see the atoms or molecules of matter, whether solid, liquid, or gaseous, we should see them all in movement of one kind or another, varying according to the nature of the thing we are looking at, its temperature, its electrical state, and so forth. But, unfortunately, we cannot see these movements, and it is even certain that we shall never see them in any direct way.

People know that the microscope reveals many things which the eyes, unaided, cannot see. It is possible, with great labor and expense, to make a microscope magnify a thing ten thousand times, and it is even possible, by a very roundabout way and under special conditions, to see things—or, rather, their shadows—which are smaller than any straightforward microscope can show.

But, unfortunately, the atoms and most of the molecules of which matter is made are vastly smaller than this. We are practically no nearer seeing an atom with the highest possible power of the microscope than we are with our own eyes unaided, so tiny are the atoms. Further, there is a natural limit to the power of the microscope, because the

size of the waves that make light is a fixed thing, and is such that no one will ever see an atom. Thus, the movements of the wood in the chair, or the atomic movements of matter in general, can only be seen by the mind's eye.

WHY CANNOT WE FEEL WITH OUR FINGER WHEN IT IS NUMB?

The feeling in the finger depends, like all other feeling, upon nerves. The nerves of the finger end in the skin in a number of tiny organs, only to be seen by the microscope, which, though tiny and never spoken about, really correspond exactly to the eye and the ear. The action of the ends of nerves and the organs at the ends of them depends very much upon their temperature. That is probably the chief reason why, in the higher animals, the temperature is fixed instead of moving up and down with the surroundings.

When nerves are made cold—as when the finger is numb—they cannot receive impressions at their ends, nor conduct them if received, and so we do not feel. This can often be applied when we wish to make a little cut, or something of the sort, in a finger, or some other part of the skin. If the thing is slight and quick, it seems a very great pity to make the person unconscious, so as to avoid pain, and it is much better just to numb the part of the skin in question, if we can.

Probably all the various things that are used for this purpose nowadays depend partly for their success not only upon what they do to the nerve itself directly, but also upon the fact that they lower the temperature of the skin where applied, and so interfere with the power of the nerves to convey to the brain that something which we call pain.

WHY IS IT THAT THE BAD AIR OF A MINE DOES NOT KILL THE MINERS?

The air of many a fashionable and world-famous New York shop, or of hundreds of thousands of bedrooms every night, is far worse than that of mines nowadays. Ventilation is one of the great problems of a coal-mine, and one of the very first that must be attended to. Year by year we go on cutting the coal away, and at the present time a year's increase in the amount taken is greater than the year's total was not so long ago. Thus the miner is always moving farther and farther away—perhaps a mile or more—from the opening; and wherever he goes a sufficient supply of air must go with him. The problem is, however, made simpler in one way, because electricity is nearly always used for lighting mines, and so, at any rate, the oxygen that would have had to be used up in the burning of any kind of non-electric lamp or candle is saved.

Failure of proper ventilation is very largely responsible for explosions in coal-mines, and possibly, also, for other accidents, through the bad effect of foul air on the mind, the watchfulness, and care of the miners. Since we have learned how important ventilation is in this respect, the standard has been much improved. An extremely expensive but very thorough way to get good air into coal-mines is to take down liquid air, which occupies very little space, and is rapidly turned into pure air ready for breathing. An arrangement has been made for carrying liquid air down by a rescuer in cases of accidents, where no one could say what kind of atmosphere he might meet in his attempt to save his fellow-workers.

WHY DOES NOT SEA-WATER MAKE FISHES THIRSTY?

Well, we might almost answer this question by another: How do we know that fishes are not thirsty? It is not at all easy to find out how much water fishes drink; but, like every other living thing, they require water, and perhaps they take a good deal. Certainly it is always at hand. We do not find that the muscles, for instance, of a fish contain higher proportions of salts than do the muscles of other animals; nor can we show any particular difference between the amount of salts in the body of a fresh-water fish as compared with the amount in the body of a salt-water fish.

We know that many fishes travel about in the course of their lives from fresh to salt water, and from salt to fresh, but no one is yet in a position to tell exactly what the fish does in these cases. It certainly is very clever to be able to adapt itself so well to such very different kinds of water. This can only mean that the organs of its body which are concerned with keeping the composition of the blood right are able, when occa-

sion requires, to filter an excess of salts out of it very quickly. The same is true of our own bodies, fortunately for us, as we often take food and drink containing an excess of various things which certainly must not stay long in the blood. On the other hand, we are not adapted to keep the composition of the blood right if we drink nothing but sea-water, as fishes can without harm.

WHY DOES THE DOCTOR FEEL OUR PULSE WHEN WE ARE ILL?

What we call the pulse is the beating of an artery which happens to lie just over a piece of bone at the wrist, and the beating of which is therefore very easily felt. The pulse, felt by a trained finger, gives a great deal of information. In the first place, it tells how often the heart is beating in a minute, and that needs no training to count; but it also tells how strongly the heart is beating, and how regularly. It tells whether the heart is strained or laboring or over-excited, or just beating easily, as it ought to do.

The pulse also tells what is the state of the arteries throughout the body, as to whether the muscles in their walls are tightly contracted or lax; and it also tells—though this requires long training to feel—not merely how forcibly the heart is beating, but how much pressure there is inside the blood-vessels of the body between the heart-beats. This question of blood pressure is enormously important, for it affects the working of every part of the body. The temperature can also be told from the pulse, as we read on page 4018. Thus, of all the single things that a doctor could possibly do, feeling the pulse tells him more than any other; more even, on the whole, than looking at the patient's face; vastly more than taking his temperature or thumping him, or even listening to his heart-beats.

WHY DO CHERRIES AND PLUMS HAVE STONES?

Perhaps we should have done better to ask: Why do stones have cherries and plums? These things are beautifully made for a great purpose, which is to reproduce the race of plants to which they belong. The all-important part of the cherry or plum is not the part we eat, but the kernel inside the stone. It is this that the new plant will grow from if it gets a fair chance; and the rest of the fruit exists in order to give the kernel, or seed, a fair chance. First, there is the hard part of the stone, which protects the living seed inside it from any injury, but which is so made that it can quite easily be split open when the kernel inside it begins to grow. Then there is the fruity part, for the sake of which we prize the cherry or the plum.

Now, birds prize this just as much as we do, and that is why it exists. Although our liking for the fruit does the plant no good, the liking of the birds for it is just what it requires. The bird takes the cherry for the sake of the fruity part, and carries it away, and then probably drops the stone in some place where it may be possible for the seed to grow. Lastly, the skin of the cherry or plum largely succeeds in protecting the fruit from insects. So now we begin to see that there is a very good reason indeed why plums and cherries should have stones. Other fruits, we know, have no stones, but they have something else, pips or seeds, instead.

HOW DOES ALCOHOL AFFECT THE BRAIN?

Alcohol belongs to the class of those chemical substances which pass very quickly and easily through any obstacle, such as the wall of a blood-vessel, and so on. Thus, in a very few moments from the time when alcohol is swallowed, it enters the blood, and then is carried in less than a minute to the brain. There it passes out through the walls of the capillaries, or hair-like blood-vessels, and meets the matter of the brain itself.

Careful work is now being done to find out exactly what chemical changes go on when alcohol meets nerve-tissue, and especially nerve-cells. At any rate, it is now clearly proved, quite contrary to what most people used to think, that alcohol stops the action of the nerve-cells which it affects; and the constant rule about its action is that it always first affects the highest nerve-cells, those which are newest in the history of the race; and after them it affects lower types of cells in their order.

Thus, the person may be unconscious, and all the rest of his brain quite thrown out of action, and yet the lowest and oldest part of it, which directs his breathing, may be working perfectly. Various

effects of all this are seen in different people, according to the different quality of their brains. The first effect is usually to make the person appear as if he had taken something to render his brain more active, and that is why most people still call alcohol a stimulant.

The explanation of this is that the highest cells of the brain are those whose business it is to control the rest—such as those by which we talk, those that act when we laugh, and so on. Therefore, when the controlling cells and the cells whose business is judgment and keeping guard are thrown out of action, we talk and laugh more freely and quickly and easily.

It is not possible here to say much about how alcohol affects the brain when too much of it is continually taken. It destroys the nerve-cells and causes the overgrowth of the substance that lies between them. This means the eventual destruction of the mind.

WOULD THE EARTH SEEM TO BE UP IN THE SKY IF WE WERE ON THE MOON?

The answer to this question is Yes, difficult though it seems at first to understand how this can be so. Yet it can be understood. The earth is a ball, as we know, and anyone looking out from the surface of that ball gets the notion, of course, that he is in the centre of all things, and that they are hung in the sky on all sides of him. We see things up in the sky, and not down in the sky, because the earth interferes with our view. If the earth were transparent, we should see the sun, the moon, and the stars *down* in the sky, even right underneath our feet, just as we see them *up* in the sky.

This must be true not only of the earth, but also of any other of the heavenly bodies. The case is the same for all of them. This teaches us that up and down have no real meaning in themselves, but merely refer to our point of view. The earth, seen from the moon, would appear far larger than the moon does to us, and correspondingly bright. There would be no mistaking the difference between land and ocean. Through telescopes, such as we have, the largest buildings of a city could be made out. The greatest difference would be, perhaps, that an observer on the moon would so often find the details of the earth hidden by clouds. As the moon has no atmosphere, or almost none, her face is never clouded to our view; not even to the very slight extent that Mars sometimes is. But anyone on Mars or the moon would wonder what it was like to live on a world so often covered with thick clouds as ours is.

WHAT DIFFERENCE WOULD IT MAKE IF THE WORLD WENT THE OTHER WAY ROUND?

This question may have two meanings, for the earth goes round in two ways. It goes round the sun and it spins round on its own axis as it does so. If either or both of these movements were reversed, there would be no consequences of any particular importance. We should still have night and day, and the seasons, which are the results of the present movements, as we have them now. Of course, serious consequences would happen if the earth's present movements were suddenly reversed, but that is another question.

The direction in which the world goes round matters a very great deal in the attempt which we are bound to make to interpret the world in which we live and the history of it.

DOES IT HELP US TO KNOW THE WAY THE WORLD TURNS ROUND?

The fact that the sun, the earth, and those planets we can observe all spin upon themselves in the same direction, and that all the planets revolve round the sun in the same direction, which is also the direction of their spinning, is of vast importance in guiding us towards true notions of the history of the solar system to which we belong.

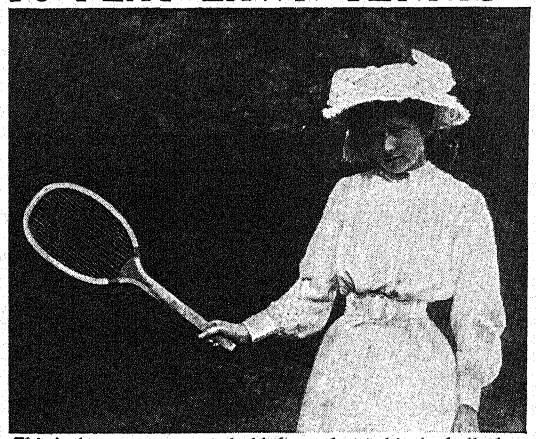
This great fact teaches us that all the motions we observe in the solar system have a common origin. They are, doubtless, the present representatives, so to speak, of the spinning of the spiral nebula from which the solar system was formed. There are one or two apparent exceptions to the rule, notably the motion of one of the moons of Saturn, which revolves around the planet in the reverse direction. Such a remarkable case makes it probable that this moon has a special history, and at one time it may very likely have been independent of Saturn, and then caught by the planet's power of gravitation.

THE NEXT QUESTIONS ARE ON PAGE 4481.

THE RIGHT WAY TO PLAY LAWN-TENNIS



Beginners sometimes hold their rackets like this, but it is incorrect for any stroke; they should be held at the end, just above the button.



This is the correct way to hold the racket to hit the ball when it comes to the right hand of the player. Note the position of thumb and fingers, and also of the head of the racket.



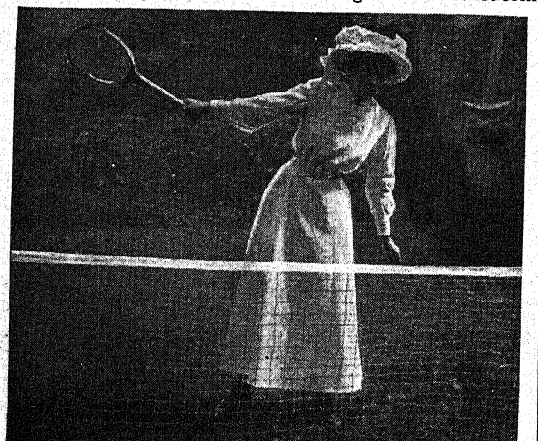
In the correct position for the ordinary underhand service the left foot is in front, and the racket is swung back in a straight line with the arm.



Here the racket is swung ready to put a screw service on the ball. The strings cut the ball from left to right as the racket comes forward.



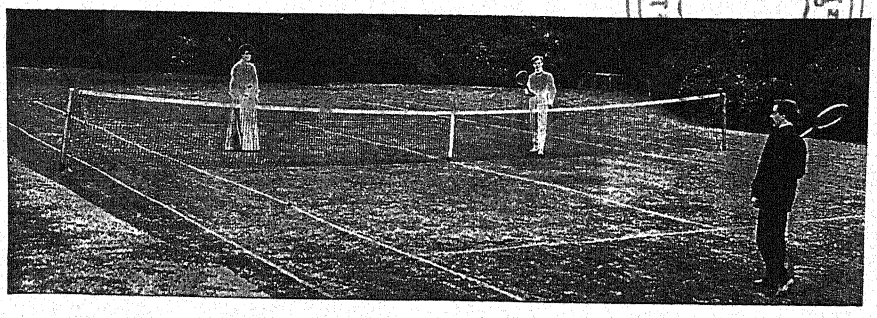
In this picture we see the right grip of the racket for the backhand stroke, used in hitting a ball coming on the left hand of the player.



This is how to perform the "round-arm smash," a useful stroke with which to "kill" weak net balls. Notice the free action, which should always be striven after in hitting.



This is the wrong way to hold the racket for a backhand stroke. The position is cramped. The thumb should not be in front of the handle.



THE GAME OF LAWN-TENNIS

CONTINUED FROM 4295

LAWN-TENNIS is an outdoor summer game, which is becoming more popular every year among both boys and girls. Only two or four players are needed for a game, and it can be played on the garden lawn if the latter is sufficiently large and level. If we are not fortunate enough to possess such a lawn, we can play in the parks, most of which have specially prepared and marked-out tennis-courts, with nets provided. Should we wish to use our own lawn, the grass must first be cut quite close to the ground and well rolled. The court is then marked out with straight white lines about two inches wide, in accordance with the plan and the measurements in the illustration.

It is not necessary for the beginner to pay a very high price for a racket, but he must see that the strings are taut, and the handle comfortable to grip. Its weight should be twelve ounces for a boy or girl of thirteen, and it should balance at the screw. A game between two is called a "single," and a game played by four is called a "double."

We will first deal with the "single" game. Before starting, the net must be raised to the height of three feet in the centre, and the players should toss for choice of side or service. If the winner chooses the side, the loser serves, or the winner may elect to serve, and then the loser chooses the side. The object in the game is to hit the ball into our opponent's court so as to make him fail to return it into our own court. Every time he fails it adds to our score, and every time we fail it adds to his score. The server must succeed, too, in hitting the ball over the net into the service court in one of two strokes, or his opponent scores a point.

The first point won counts 15, the second 30, the third 40, and the fourth a game. When both players reach 40 it is called "deuce," and a player does not add a game to his score until he wins two points in succession, the first being won when the ball is served from the right-hand court, and called "vantage in." It is "vantage out" if he loses the first point, but "deuce" again if he wins the next point. The server must stand behind the base line to the right of the centre, and throwing up or dropping the ball with the left hand, according to whether serving overhead or underhand, strike it with the racket before it reaches the ground, so that it shall fall in the right-hand service court on the other side of the net. Should the ball fall into the net, or outside the service court, the service is called a fault, and he tries again. If this service, too, does not fall into the service court, the receiver scores a point.

The receiver should stand somewhere near his base line ready to hit back the ball while in its first bounce. In this first stroke he is only allowed to hit the ball in this way, but after this stroke both players may hit the ball before it bounces, or "volley" it, as it is called. If the player lets the ball bounce a second time, his opponent wins the point. The receiver may return the ball into any part of his opponent's court, and the server, in returning it, may this time hit it into any part of the court. The two players hit the ball to and fro over the net to each other until one fails to return the ball within the opponent's court.

When the first "fifteen" is lost and won, the server delivers his second service from the left-hand side into the service court diagonally opposite him, and the receiver also moves to his left-hand side.

On the completion of the first game the receiver becomes server, and the players serve in turn until one of them gains six games, which count as one set. Should both players count five games, they may decide to play on until one of them is two games ahead of the other.

It is most important that we should hold our racket correctly. For serving and hitting the ball when on our right hand—the forehand stroke—we should grip the racket firmly at the end, the button just projecting beyond the little finger. For hitting a ball coming to our left—the backhand stroke—it is best to move our thumb so that it points along the length of the racket, and with some players the latter is slightly

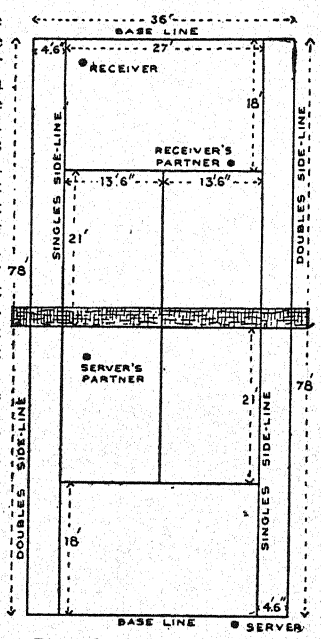
twisted round in the hand. The essential thing to remember, however, is that the centre of the racket should meet the ball at right angles.

There are two ways of serving, the underhand and the overhead. In the easier underhand service the racket should be held firmly in a straight line with the hand and arm from the shoulder, and swept like a pendulum by the right side of the player, hitting the ball, which must be dropped into its path from the left hand. The movement should not stop immediately the ball has been struck, but the racket should follow the ball's path. It should, indeed, be a general rule in playing that the bat follows through its stroke, as much more certainty is given to the stroke, and a much freer action is thus gained.

In the overhead service the racket is carried behind the head, the shoulder being back and down; the ball is thrown up above the right shoulder about three or four feet, and the racket is then swung over so that the centre of the racket hits the ball as high above the head as possible. The left foot should point to the net, and the right foot should be almost at right angles to it, and the body should also be slightly turned away from the net. The greater weight of the body, which at first is on the right foot, becomes transferred to the left as the ball is hit. The racket should always follow through towards the left knee. We should rather make the mistake of sending the ball over the service line than hitting it down into the net. A ball falls naturally, and we should first endeavor to hit at a spot about a yard or so above the top of the net. The power of imparting twists, swerves, and screws to the ball comes naturally to most players after a few months' practice, and is obtained by drawing the surface of the strings across the ball as it is being hit. The server should make certain of sending an accurate second service, should the first one be a fault. Variety of pace and placing should be aimed at more than mere fast pace.

The opponent, or receiver, should stand at the distance behind the service line where he expects, from experience of the server, that the bouncing ball will have begun to drop to the ground. He should avoid having to hit the ball as it rises to the top of its bounce. Half-volleys in tennis are the most difficult balls to return, and to be forced to take a ball on the half-volley is generally a sign that the player is in a wrong position—his aim should be to avoid having to play this stroke. He should be satisfied with getting the service, especially a hard one, back with a good length, that is to say, to fall near the base line. Every player should hit the ball with a firmly-held racket, keeping his arm as free as possible. His racket should meet the ball rather than let the ball meet the racket. He should be sure to time the ball accurately, and put weight into his stroke from his shoulder and body, and he should keep his eye on the ball until it is right on the racket. If his opponent is running up to the net, it is good policy to lob or hit the ball gently up over his head and out of his reach. Beginners should hit the balls after they have bounced, and make sure of a good length and accurate direction. Later they should practise volleying, and this can be done against any blank wall.

In volleying, the beginner should always try to take his low volleys with the head of the racket above the wrist, and to get his feet in the right position, thus: for a low forehand volley his left foot should be forward, for a backhand volley the right foot should be in advance. For overhead volleys very careful watching is necessary, and any easy balls hit as hard as possible so as to "kill" them.



Plan of a lawn-tennis court.

In play we must always aim at hitting our balls well out to the base lines rather than hit them gently just over the net. We must always remember, too, to start at once for our ball, and not to wait until it is over the net before going for it.

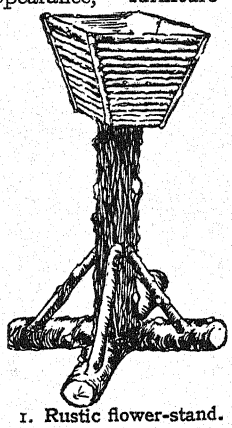
In tennis we must learn to be very nimble indeed, and to recover our balance and position at once, especially when we have run back to take a lob over our head. Finally, to play well, it is absolutely necessary in such a quick game as tennis to concentrate one's whole mind on the game, and never to play slackly for an instant.

There is no difference in the scoring in a "double," but a larger-sized court is used, and the side lines of the single court are only used as boundaries to the service courts. Partners serve in turn thus: W and X are playing Y and Z. W serves, then Y, then X, and lastly Z. Z stands in the right-hand court for W's first service, while X is on W's left. For the second point W changes sides in his court with his partner, X, and serves from the left-hand court to Y. On the completion of the game W stands to the right-hand side of the court to receive Y's first service. Only the server and his partner change their positions. In "doubles" it is the object of each pair of partners to beat the opposing pair, and they must help each other to this end as far as possible. It is best to decide that each should have the balls that come on his side of the centre line. Another way to play, which is not quite so useful, is for one player to take the balls that fall near the net, and his partner those that fall near the base line.

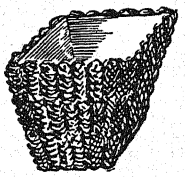
EASY AND USEFUL RUSTIC CARPENTRY

IT is less expensive to make many articles of rustic carpentry for the garden than it is to purchase the factory-made or shop-made articles that serve the same purpose, and that do not look nearly so appropriate to their surroundings. If we look at the large pedestal flower-box in picture 1 we can see that this work is eminently attractive in appearance, and it is comparatively easy to do. For the flower-box in question we first make the box itself. This is made of plain boards—four of them—from any old packing-case that we are fortunate enough to possess. The four should be, say, 15 inches wide at the top, 15 inches deep, and an inch thick. But the sizes are not important so long as all four pieces are the same size.

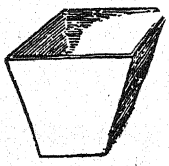
The bottom should be square and not less than one inch thick, its size being suitable for the bottom or smaller end of the box. Its edges should be trimmed or planed to a bevel so as to fit the sides accurately. We should make four or five half-inch holes in the bottom—not in the centre—to carry off the water which may accumulate in the box, and which, if left, would turn the earth sour and kill any growing plant. This part of the box, when made, will resemble that shown in picture 3.



1. Rustic flower-stand.



2. Pine-cone decoration.



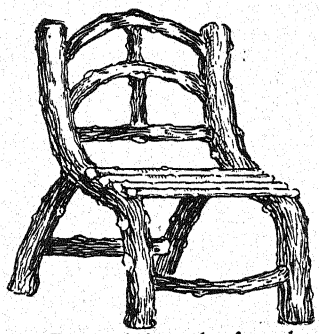
3. The plain flower-box.



4. Virgin cork decoration.

Now we want the centre post, which should be a piece of natural wood from three to five inches thick and about three feet long. It should be sawn off straight across both top and bottom. If there is any difference in the thickness of the wood, we make the thinner end the top. We put the box that we have made on the top of the post, in the centre, and put several good long nails right down into the post. About three nails, each five or six inches long, will do well enough. Next we put two cross-pieces for a base, checking them in the middle if necessary. These pieces should be about the same thickness as the upright post, but may be a little thinner. Long nails are put right through where these pieces cross up into the bottom of the post. Now we nail on the supporting pieces which join the feet and the post, choosing bent pieces that lend themselves to our purpose; or, if the pieces happen to be straight, we must saw them off at one angle, thereby making it easy to nail them on at the spots where they fit. We can now decorate the outside of the box. We nail split branches, about one inch thick, round the top and bottom edges of the box, and up each of the four corners. The sides of the box we can fill in with smaller split branches, after which we have, at no expense and with little trouble, completed a very presentable piece of garden furniture that will hold a large plant. In picture 2 is shown a box the sides of which are ornamented with pine-cones split in two halves lengthwise, and in picture 4 is seen a box with virgin cork ornamentation. Either of these is easily applied instead of split branches. Before putting a plant into our flower-pot, we ought to put at the bottom a layer of stones, broken bricks, or pieces of broken crockery, as this enables moisture to drain from the roots. No plants are healthy if there is no means by which the water may run away from their roots.

Of course, if we use the flower-stand as described, it must be set in a place where any water that may be dripping through the holes will do no damage. If placed in a tiled conservatory or porch, or in the open, it would be all right, but in a drawing-room or living-room it would probably spoil the carpets. If we want to change the plant frequently, we can put a square-shaped flower-pot inside the flower-stand. Then, when we wish to remove the plant, we simply take this inside pot and put in another. The last picture illustrates a rustic chair made of oak branches, the crookedness of which makes them very suitable for chair work. After reading the description of the flower-stand, any boy will be able to make the chair without detailed particulars, and if he is successful in this he may go on to tables, garden seats, and even rustic summer-houses, all of which are both picturesque and useful. The best time for work of this sort is in the autumn, when growing wood is drier than at other times, for it then contains much less sap. It must be remembered that wood with a covering of bark is liable to be the home of insects, so that in time the bark falls off as the wood dries. For this reason it is very much better to use wood that has lain exposed until the decayed bark has fallen off. By doing this we avoid the unsightly appearance that rustic work attains when the wood sheds its bark.



5. Rustic chair made of rough branches.

FRACTURES, DISLOCATIONS, AND SPRAINS

A FOURTH LESSON IN FIRST AID TO THE INJURED

CONTINUED FROM PAGE 4289.

A FRACTURE of the skull should always be regarded as a serious matter by those who render first aid, owing to the possibility of the brain being injured. The upper part of the skull is usually fractured by direct violence, as by a blow on the head, or by the head striking the ground or some hard object during a fall.

Fractures of the base of the skull are caused indirectly by a fall upon the head or feet or lower part of the spine, or by a blow upon the lower jaw. The signs of a fracture of the base are unconsciousness and the issue of blood from the ears or nose. In such a case it is essential that medical aid be obtained at once, but in lifting the injured person and carrying him to a doctor's the greatest care must be taken to support the head, and by means of a well-arranged coat, used as a pillow, to prevent it from rolling about from side to side.



How to bandage a fractured jaw.

When the upper part of the skull is fractured, there is frequently considerable swelling, and, sometimes, a wound allowing the bone to be seen. If the injury is a bad one, unconsciousness will come on more or less rapidly, and if it is very bad the unconsciousness will be immediate. In all cases of injury to the skull resulting in unconsciousness the patient should be kept thoroughly warm, any flow of blood should be stopped, tight clothing should be gently loosened, the free access of fresh air should be secured, and no food or fluids should be given while unconsciousness continues. When consciousness returns, water may be given, and the patient must be warned against any movement.

When the lower jaw is fractured, there is great pain, the patient's mouth remains open, he is unable to speak or move the jaw, the teeth are uneven, and there is bleeding from the gums. In such a case, with the palm of the hand raise the lower jaw into position, place the centre of a narrow bandage under the chin, take one end over the top of the head, and cross the two ends at the angle of the jaw, as shown in the first picture. Then carry the long end round the chin, and tie the two ends of the bandage at the side of the face; or, if no bandage is available, two handkerchiefs may be used, as in the second picture.



Handkerchiefs used as bandages for the face.

A fall on the hand or arm very often breaks the collar-bone, and the result is inability to raise the arm above the shoulder and a leaning of the head to the injured side. This is a common accident on the football field. The broken ends of the bone can usually be felt overlapping. To render aid in this accident, remove the patient's coat, make a large soft pad, and place it in the armpit; then, while the shoulder is kept well back, the forearm should be bent up and supported in a sling. To make the sling for a fractured collar-bone we take an open triangular bandage, and, placing one end over the uninjured shoulder, let the bandage hang down in front over the injured arm, with the point reaching beyond the elbow. The lower end of the bandage is now passed under the arm, across the back, and the two ends are tied on the sound shoulder. The point is folded over the elbow of the injured limb and pinned down as in the third picture, another bandage, folded broad, being tied fairly tightly round the body and elbow as shown.

Sometimes a person is so unfortunate as to break both his collar-bones at one time. In this case a narrow bandage should be tied round each arm, as shown in the fourth picture, and the ends passed across the back and round the body, and then tied together in front, as in the fifth picture. Before the bandages are tied in front, the two forearms should be raised, with the hands rather higher than the elbows, and they should be supported in the bandage. The purpose of the bandages tied to the arms, just below the shoulders, is to keep the shoulders well back. This gives relief to the patient, and prevents the broken bones from doing any damage.

In a case of fractured shoulder we place a broad bandage under the armpit of the injured side, carry the ends over the sound shoulder, and, taking them round, tie under the sound armpit. Then we support the limb in a sling.

A fracture of the spine is very serious, and often causes instant death. If the patient lives, he must be lifted very carefully and without the slightest jolt on to a stretcher, covered with garments to keep him warm, and carried at once to a doctor's.

When the ribs are fractured, the patient is unable to breathe properly or to cough, owing to great pain, and if the hand be placed over the injured place and a deep breath is taken, a grating of the broken bone or bones will be felt. The ribs most generally broken are the sixth, seventh, eighth, and ninth, and the fracture is usually about midway between the breast-bone and the spine. Fracture of the lower ribs on the right side may injure the liver, and cause

blood to be coughed up. If the fracture is a simple one, and no internal organs are injured, the treatment is to place a triangular bandage folded broad round the body, and tie it on the sound side. It is even better to fasten two bandages in this way, one above the other and overlapping. If triangular bandages are not available, a folded towel may be used, and fastened with safety-pins. The arm on the injured side should be put in a large sling. If a roller bandage can be obtained, it is even better than the triangular, and when rolled round the chest, from below upwards, gives great ease and comfort to the patient.

When the breastbone is broken, all tight clothing must be loosened, and the patient kept warm and quiet, in as comfortable a position as possible, until a doctor arrives.



Method of bandaging for a broken collar-bone.

One other kind of fracture must be mentioned, although it is rarer than the others that have been referred to—that is, a fracture of the pelvis. The patient will be quite unable to stand, and will not be able to move the lower limbs without intense pain. The danger of injury to internal organs is great, and the patient must be laid in a comfortable position, and have a broad bandage tied round the hips sufficiently tightly to give support without pressing the broken bone against the organs. If the injured person is moved, he must be lifted upon the stretcher with the greatest care, but it is better to bring the doctor to him than to take him to the doctor. Even when no bones are broken a person may suffer a dislocation—that is, two or more bones may get out of place. Dislocations of the lower jaw, the shoulder, elbow, and fingers are by no means uncommon. There is great pain near the joint, with loss of power in the limb, and frequently swelling of the joint, which sometimes becomes fixed. Only a qualified doctor should attempt to replace the bones, but we can help the patient by supporting the limb on pillows or coats, by very gently applying cold-water pads to the injured joint, and by following these with hot-water dressings.





How to bandage when both collar-bones are broken.

Another quite common injury is a sprain. This is frequently caused by a sudden jerk or wrench, which causes the ligaments round a joint to become stretched, or sometimes even torn. There is a great deal of pain at the joint, with swelling and much color.

The ankle is the joint most frequently sprained. If the injury occurs out of doors, a bandage should be bound over the shoe. Place the bandage under the foot, bring the ends over the instep, and then bind round and round the ankle, fixing it firmly. If the bandage be moistened after it is tied in position, it will be tightened and become more effective. This outside bandage will enable the patient to move more easily to a shelter. The shoe and stocking should then be removed in the proper first-aid manner, and cold-water dressings should be applied to the joint, which must be placed in a comfortable position. If the cold water does not give relief, hot-water dressings may be used. This treatment is for a sprained ankle; sprains of the other joints may be treated in the same way as dislocations.

Strained and torn muscles are not uncommon. They cause much pain and weakness. The patient should rest in as easy a position as possible, and heat—applied either by hot-water bottles or hot-water dressings—will relieve the pain.

Very often a fall or a blow that is not sufficiently severe to cause a fracture may give rise to hæmorrhage, or bleeding underneath the skin, but without breaking the skin. This is called a bruise, and, if it is a severe one, may cause much pain and great swelling and discoloring of the skin. A black eye is a familiar example of a bruise. The best treatment is to apply cold-water dressings to the place, or better still, if ice is available, the ice should be applied.

Before closing the lessons that deal with fractures and their treatment, there are one or two points upon which too much stress cannot be laid. When the accident has happened, no attempt whatever must be made to remove the patient until the broken limb has been bandaged with a splint, so that the bone is fixed and the broken ends are unable to do any further damage to the flesh or blood-vessels near them. To some of us it may seem only a small thing to move a patient from the roadway to safety on the pavement, or from the actual football ground to a place somewhere at the side, but such movement before the limb is bandaged with splints would be most serious and very painful, and might even be disastrous. Then, while the bandages and splints are being prepared, the broken limb must always be supported and kept perfectly still, and, lastly, if the leg should be injured it must always be straightened very carefully by pulling before the bandages are finally tied.

CONTINUED ON PAGE 4616.

WHO ARE THESE PEOPLE?

A CHARACTER PUZZLE GAME FOR BOYS AND GIRLS

IN the following game the character of some persons mentioned in THE BOOK OF KNOWLEDGE is described. Someone reads the description aloud, and the boy or girl who gives the greatest number of correct names wins the game. It is best to write the names on a slip of paper, so that everyone who is playing has an equal chance. The solutions will be found on page 4500.

THE MAN WHO PREACHED HAPPINESS

1. There was once a handsome boy who loved fun and amusement. He thought of little else except how he and his companions could enjoy themselves. Yet he was generous, and often gave gifts to others. Animals knew he was fond of them, for his horse showed pleasure at his appearance, and birds came at his call to perch on his shoulders. As he grew older, he had more serious thoughts of the world about him, and puzzled over his own existence till he came to realize that love—love to mankind, to the birds, and the beasts, and the flowers, and, above all, to the good God and Father of all—was the thing of supreme importance. So he refused to dress in costly garments. He gave away all he had, and went about speaking kind words and doing good actions, trying to teach people the real secret of happiness.

A RULER OF ENGLAND

2. As we look at the portrait and think of this man, we can understand how people ran to do his bidding, for he said what he thought right, and to him speech meant action. The man knew his own mind and his own power. He possessed no polished manners or courtly graces, but he had a sturdy self-reliance and strong will-power that was easily stirred to right an injustice or to defend his home, his country, or his religion. Yet, like other men of strong character, he showed a tender heart to the weak and young, made a companion of his little granddaughter, and was very good to his feeble old mother. Some people say he was cruel, forgetting that leniency is sometimes great unkindness, and that a surgeon often has to inflict pain in order to cure.

THE MISER WHO HATED A GOOD MAN

3. We picture before us a repulsive man, with black hair, ugly face, and claw-like hands. He grabs all the money he can and hoards it up. His heart is full of envy and spite against those who are generous. He once loved his wife; but now no one, not even his daughter, really loves him, because, though he has the power to do good that money gives, his mind is getting narrower and his soul is becoming dwarfed. He lends money at high interest, which he extorts to the very last farthing. Some people have been unkind to him, and have despised him for his nationality and race; but, instead of pitying and forgiving them, he becomes more self-centred, and harbors revenge. He tries to outwit others by cunning and lying, hardens his heart, refuses mercy, and plots against the life of another. But when truth and goodness are too wise and too strong for him, he shows himself an abject miser, and says he would rather die than give up his worldly wealth.

THE MAID WHO LED AN ARMY

4. There was once a maid who lived in the meadows tending sheep, whose eyes rested on the beauty of the blue sky and soft, snowy clouds, and whose ears listened to the song of the lark and the murmur of the brook. Her thoughts were beautiful, too, and pure as an innocent child's. She saw lovely visions of good and glorious beings who talked to her and helped her to do right. Her country had been conquered by the foreigner, and she mourned the fate of her dear native land. One day, when she was musing in the fields, it seemed to her an angel called to her to arise and save her country. Now, she was only a simple, ignorant maid, yet from that moment so strong a determination to help her country and secure its freedom filled her whole mind that she banished all thought of herself. And she was steadfast to her resolve, so that battlefield, hardship, insult, suffering, and imprisonment were powerless to break her spirit, until the enemies of her country wickedly burned her at the stake.

THE GIRL WHO NURSED HER DOLLS

5. A little girl used to be very fond of her dolls, and pretend that they were ill and wanted nursing. She loved animals, too, and liked nothing better than tending sick and feeble creatures. As a child, she cared for her dolls and pets; as a woman, she spent her energies in nursing. Brave and merciful, she went hundreds of miles away from home to care for the wounded on the battlefield. She found things in a terrible state. Soldiers who had been badly injured by shot and shell were lying on the hard, cold ground. The attention that they received was of the roughest. They were dying in scores for the want of proper nursing and nourishment. With an energy that was simply wonderful, she set herself to alter it. She succeeded in her purpose, and through her great efforts she has robbed modern warfare of many of its terrors. She showed herself unselfish and generous, for the money people sent her as a present she gave to found a training home for nurses.

THE SHEPHERD BOY OF THE EAST

6. There lived in the East a shepherd boy who made sweet music and wrote lovely poetry. His mind was filled with great ideas about the goodness of God and the beauty of Nature. At times he was happy and glad to be alive; but sometimes he grew depressed and melancholy, and prayed God to overcome his enemies. Yet his spirit always rose, and he became more hopeful. He was capable of doing mean and wicked things, but he repented so bitterly that we are told he was a man after God's own heart.

SOME PUZZLE RHYMES AND VERSES

ALL kinds of puzzles may be worked into rhymes and verses, and it is a very interesting pastime for a rainy day or for a dull evening to solve such puzzle rhymes, and still more interesting to make up original verses of this kind.

For instance, here is a puzzle rhyme:

What is the word referred to in this little verse?

First a *c* and *a t*, last *a c* and a *t*,
With a couple of letters between,
Form a sight that our eyes are delighted to see,
Unless in their sight it is seen.

Here is another similar verse telling how to spell a certain word:

Inscribe an *m* above a line
And write an *e* below,
This woodland flower is hung so fine,
It bends when zephyrs blow.

Dr. Whewell, the great mathematical scholar, once wrote out the following four lines, which can be read as a verse of rhyme. Let us see if we can understand it.

O O N O O
U O A O O I O U
O N O O O O M E T O O
U O A O I D O S O
I O N O O I O U T O O

When we have solved this curious puzzle, we should try to invent some other clever problems of the same kind.

BURIED NAMES

Names may be buried in verses, and it is interesting to dig these out. In this stanza of four lines are buried the names of four animals—that is, the names of the animals are found in the verse spelt properly, the letters running one after the other in their right order.

Poor wretch! a moisture filled his eye,
"Do not rebuff a lonely boy,"
Said he, "If ere I sink and die
Your smile, O! pardon will be joy!"

Here is another stanza in which are buried the names of eight British poets.

The sun is darting rays of gold
Upon the moor. Enchanting spot!
Whose purple heights, by Ronald loved,
Up open to his shepherd cot.
And sundry denizens of air
Are flying, aye, each to his nest;
And eager make at such an hour
All haste to reach the mansions blest.

Who are these eight poets?

In this stanza there are hidden the names of four fruits. What are they?

Go range through every clime, where'er
The patriot muse appears,
He deeds of valour antedates,
His ban an army fears.

ARITHMETIC IN RHYME

Here are some arithmetical problems in rhyme, which we shall find quite interesting to solve. First of all, who can do this?

Twenty-seven with three nines
You and I can score,
Anyone on other lines
Can extend them more;
Who can write them to be seen
Equal only to sixteen?

A man being asked the ages of himself and his wife when they were married, replied:

When first the marriage knot was tied
Between my wife and me,
My age as oft repeated hers
As three times three does three;
But when ten years and half ten years
We man and wife had been,
Her age came then as near to mine
As eight does to sixteen;
What age was hers, what age was mine
When we were wed, from this divine.

This is a little problem that is quite easy when you know just how to do it.

A third of six behind them fix
A third of six before,
Thus make two nines, when all combines
Exactly fifty-four.

A little boy asked his father how old that parent was, to which the father replied:

I was twice as old as you are
The day that you were born;
You will be just what I was then
When fourteen years are gone.

What were the ages of the father and son?

RIDDLES IN RHYME

Some very ingenious riddles can be asked in rhyme. Here is one:

With letters three indite my name,
Add one to show what I became,
Or try to tell what brought me fame.

The name is that of a well-known literary man.

Here is another conundrum in verse:

Often talked of, never seen,
Ever coming, never been,
Daily looked for, never here,
Still approaching in the rear.
Thousands for my presence wait,
But, by the decree of fate,
Though expected to appear,
They will never see me here.

What is the solution of this?

SOME CHARADES

It is quite an active mental exercise as well as a pleasant amusement either to write a charade in the form of a rhyme or to solve one. In a charade, as we of course know, a word is taken, each syllable of which has an independent meaning, as in the name Campbell. Here are one or two clever charades:

My first is a circle, my second a cross;
If you meet with my whole, look out for a toss.

My first makes company,
My second shuns company,
My third assembles company,
My whole puzzles company.

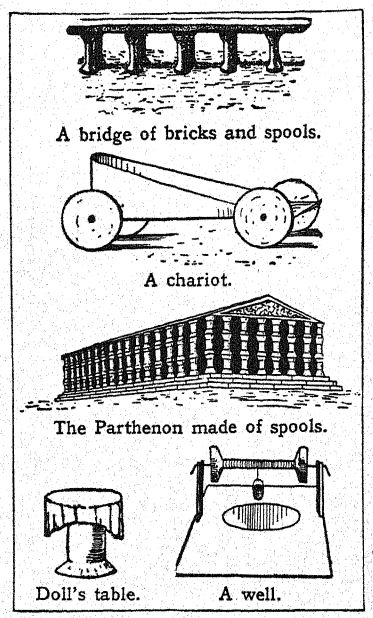
My first I hope you are,
My second I see you are,
My whole I know you are.

THE SOLUTIONS TO THESE RHYMES AND PUZZLES WILL BE FOUND ON PAGE 4500 OF THIS BOOK.

WHAT TO DO WITH SPOOLS AND BRICKS

IF we save all the empty thread spools and put them into the playbox, we can spend many happy hours playing with the spools and a box of toy bricks. When not in use, we can keep the spools threaded on to a piece of string to prevent them from rolling into out-of-the-way corners. One of the most interesting things we shall be able to make is a little bridge to span a river.

First we must pick out ten fairly long spools to form the supports of the bridge. These spools we must soak in hot water to loosen the paper labels, which can then be scraped off. We place the spools on end in five couples at equal distances apart, and join them up with long bricks, or a strip of card, cut the width of the two spools, which is long enough to span the river and rest on the banks. We can build up bricks to support the ends. The card can be nailed to the spools with tin-tacks near the edges, and if we care to make parapets, two strips of card can be bent at right angles and the bent part glued down over the heads of the nails. This little bridge will be fairly substantial, and real water can pass under it, while over the top we can run a toy motor-car or train.



A bridge of bricks and spools.

A chariot.

The Parthenon made of spools.

Doll's table.

A well.

If we place four long empty spools on the table, two and two, on their sides, they suggest to us the possibility of making a pair of roller skates. A piece of thick wire must be bent round each end of the narrow central part of a reel, and a little sheet of tin, such as we can get from a preserved fruit or meat tin, should be shaped like the sole of a boot and attached in place by the wire coming up from the reels. Black tapes can be used for straps, and drawn under the tin near the wheels. A small glass dish, such as that in which potted meat is sometimes sold, might be tied on to the tin, filled with flowers and placed on the table, where it will make a novel flower-vase for pansies or other short-stalked flowers.

Another little toy, a miniature chariot, can be made with two long spools, as long as we can get, placed on their sides, one in front of the other. On the central part of the spool we lay a flat piece of wood from the box of bricks, or a piece of cardboard. This we can secure to the centre of the spools with twine. A sloped piece of card is then glued round the front of this, as shown in the picture. We can then make the chariot bright by covering it with silver paper. This serves as a very pretty holder for a glass of flowers. In a similar way, a truck, such as railway porters use, can be made by leaving out the card at the front, and adding parts of wooden skewers for handles.

To make the third toy shown in the picture, take three long, narrow spools and place them one on top of the other in piles, arranged eight in a row in front, eight at some distance behind in line with the others, and the intervening space along each side filled with fifteen piles. What we are making is a model of the Parthenon at Athens. Having built up the columns, we place a row of bricks along the summits, place triangular pieces of card at each end to support two large pieces of card which will serve for the roof, and we have a rough copy of the Parthenon.

There are plenty of old churches in London and other cities built in this Doric style, which we can also imitate. A church steeple ending in one spool, with a wire or pin weather-cock inserted in it, is simple to construct. Another thing we can build with our spools is a tower, and for this we shall want plenty of long, narrow spools. After making a brick foundation, we place a dozen or more spools close together in the form of a circle, and lay a disk of brown paper or card between each circle until seven tiers are built up, using fewer spools as we ascend. If we are skilful enough to place some of the disks a little on one side, we can imitate the tilt of the Leaning Tower of Pisa, shown on page 319.

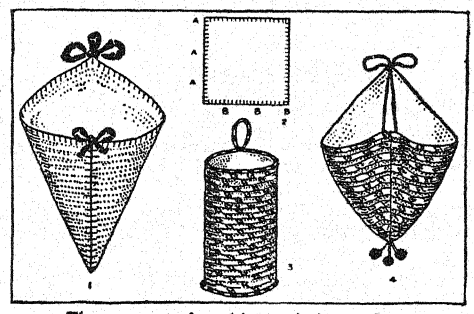
Other spools besides cotton-spools may be available for making small toys. The spools on which wire is wound make nice wheels for a child's go-cart or mail-cart. The body of the cart is made of wire bent in a similar way to that used in making doll's furniture, described on page 1733. If a piece of white paper be pasted over one end of a short spool, we have a table for the doll's house.

We can make quite an elaborate toy in the following way. A wooden skewer, cut to a suitable size, is wedged into the central hole of a long spool, and is supported at the two ends in grooves of two upright pieces of wood which are glued to a piece of card with a circular hole in the middle. Two long, stout pins are hammered into the ends of this improvized wheel, and bent at right angles to form two handles used in winding and unwinding a thread rope, to which a little bucket is attached. A thimble, with a piece of wire encircling the rim and forming a handle, does nicely for this. Twine or coarse sewing thread will do for the rope, which should now easily draw up bucketfuls of water out of a tumbler over which the little well-head may be placed.

HOW TO MAKE A HAIR-RECEIVER

THERE are many ways of making a hair-receiver; we are going to describe three very pretty patterns which are quite easy and inexpensive to make.

That shown in picture 1 is made from a piece of canvas about six inches square. The edges of the canvas are worked with button-hole stitch in silk or bound with a pretty-colored ribbon. When we have done this, we must sew together neatly the two sides marked A and B in picture 2, tie a dainty bow of orange or pale blue ribbon on it, and the article is complete. If we like we can work a daisy or some other flower on the top and the two sides. Another kind is made from an old cocoa-tin, covered with silk and crochet work.



Three ways of making a hair-receiver.

We should choose a small can, line it all over with silk, and then cover the outside with crochet work. Strawberry or a coral shade of pink gives a pretty effect.

When the tin is lined, we must get some thick silk and crochet a strip large enough to go right round the tin. The pattern of the crochet should be three treble, three chain, three treble, three chain, and so on. We learned how to crochet on page 1364. Then carefully sew it on to the lining, and edge top and bottom with a fancy cord, making a loop at the top by which to hang it up. Of course, the silk and cord must match the lining.

The finished hair-receiver is shown in picture 3. The third, and perhaps the prettiest, pattern of all is this. Crochet a square in white cotton, and line it with very soft pale pink silk, so that one side is crochet and the other silk. Then crochet two pieces of chain stitch long enough to go across from corner to corner, and sew it on. Then sew three pink balls on to the end of three tiny crochet chains, and fasten the other end of the chains to the bottom of the bag. If they are too big, the effect will be spoiled. The little crochet bow, shown in the last picture on this page, is fastened on by the crochet needle, and the crochet chain extended, taken through the front of the bag, and fastened off by the bow at the top. This is to act as a support to the crochet, which, being so soft, would otherwise fall down.

A LITTLE VEGETABLE GARDEN

WHAT TO DO AT THE END OF SEPTEMBER

IF the seeds of the globe beet were sown in good time in the spring, the crop should be ready to dig and store. It is necessary to lift these vegetables very carefully; they must not be pricked or cut, or the skin in any way broken, or even the tap root broken off short, or the juices will escape, and the vegetable deteriorate. The long beet is a somewhat later crop.

As soon as we have cleared away a crop, we may dig over the ground deeply, so as to let sun and air do their wholesome, sweetening, and purifying work.

Another gardening operation that will need attention is the earthing up of the celery. Some rows may already have been done, but the later rows will now be ready. The best time to choose for the work is while the soil is still slightly moist from rain; if the weather is dry, however, a thorough watering should previously be given, pouring the water close down beside the plants.

The scarlet runner beans will probably be producing more pods than are needed for present use, and, rather than leave them to exhaust the plant, they may be picked and preserved for winter use. This is a very simple matter, and all we need is a jar. We put a layer of beans and then a layer of salt, alternately, until the jar is full, and then fasten the cover down firmly. Before use, the beans must be well soaked in water to extract the salt from them.

There may still be potatoes to lift, and not only to lift, but to store. For potatoes, for carrots, and also for beet, as convenient a method as any is to make a *clamp*, so long as it is well made and capable of keeping out the winter's frost. We place our roots, or our potatoes, under straw and soil. First of all we dig a round pit in the ground, say, some six inches deep, and line the bottom and sides with a good layer of dry, clean straw. Next we make a heap of our potatoes or our roots of beet, and, later on, of carrots. Over these we must place a thick covering of straw, and on the top of all a layer of soil about seven inches thick. When the soil is in place, the back of the spade should be used to beat it down tight and close, and probably that seven inches will be greatly reduced and more soil will need to be added to it.

But we should not quite cover the top; a hole or two should be left for a time, because the moisture in the vegetables and soil must have an escape. When the real wintry weather sets in, we can put some extra straw into these ventilation holes. We must not forget, when storing our potatoes, to look them well over, and to throw out any that show signs of disease. Potatoes once lifted from the ground should be kept as dry as possible, and should not be exposed to the light longer than is necessary.

If beet, parsnips, and other *root* crops are not stored in clamps, but are kept in some cellar or outhouse, some sand should be

placed between them to prevent their drying and shriveling. It is important to remember that the frost must never be allowed to reach them.

At this season of the year there will be an abundance of rubbish in the garden, old pea-tops, weeds, cabbage-stalks, and much else. If we are allowed a bonfire, this is not only the best means of getting rid of the rubbish but also of turning it to good account, for the ashes of vegetable matter contain many things that are necessary for living plants to have; so that all the ashes left should be dug into the soil.

It is often a little difficult to decide if the apples and pears should be gathered or hung a little longer. Much depends, of course, upon the variety, and a good test is to cut one of the apples in halves and examine the pips. Are these quite ripe and black? If not, the fruit has not fully matured; but if they are quite colored a uniform black, and the fruit severs easily from the branch, then we may take it for granted that it is ready for storing.

The great point in fruit-gathering is to see that it is not bruised. Wind-falls should be kept separate, and should never be allowed to lie longer than can be helped on cold, dew-laden soil.

Of course, they are for immediate use, but they are much better if carefully treated, gathered up each morning and laid out separately. Steps are very useful for gathering the low fruit on the outside of a tree where it is difficult to reach from the ladder.

It is quite time to prepare the ground by digging, not forgetting to add some stable manure, if we contemplate planting fresh fruit-trees next month or the month after. It is a good plan thus to prepare the soil in readiness some little time in advance of planting, as this gives it the chance to settle.

MAKING A CHEMICAL WEATHER-GLASS

WE may have seen a curious-looking weather-glass in the form of a round tube containing a liquid which becomes clear or cloudy, or flaky or spotted, so that we can tell what sort of weather we are going to have. Some weather-glasses are really very good, and are very easy to make. First we require a glass tube ten inches long and three-fourths of an inch in diameter.

We should purchase at any chemical instrument dealer's shop a test tube of this size, for which we may have to pay only a few cents. We can fasten it to a flat piece of wood if we wish to hang it on the wall, or, if we wish it to stand, we can make a round base with a round hole in the middle, so that the tube can go into it about one inch.

The method of making the wooden frame or base is not important, and is only for the purpose of steadying the tube. When we have done this, we must have a prescription made up at the druggist's. Here it is:

Camphor, two drams.
Potassium nitrate, half a dram.
Ammonium chloride, half a dram.
Absolute alcohol, two ounces.
Water, two ounces.

The price of this mixture will be somewhere between fifteen and thirty cents. If the solid ingredients do not dissolve readily, they may be assisted by shaking the bottle, and even by putting the bottle in a little warm water, taking care, however, that more water is not allowed to get into the bottle. When the mixture is properly dissolved, it should be poured into the weather-glass tube that we have already prepared.

Then we put a cork in the top of the tube, to keep out any dust that might get in. The weather-glass is now ready for its work, and may be hung up or placed wherever we wish to have it; but it is best placed exposed to the north and in a shady place, where it cannot get the direct rays of the sun. The appearance of the liquid will change when the weather is going to change. Here are the indications:

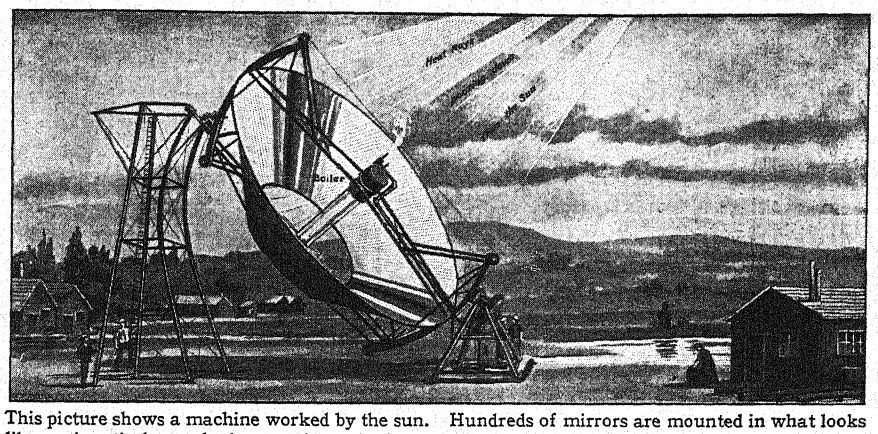
Clear liquid—Bright weather.
Crystals at bottom—Thick air, frost in winter.
Dim liquid—Rain.
Dim liquid with small stars—Thunder.
Large flakes—Heavy air, overcast sky, snow in winter.
Threads in upper part—Windy weather.
Small dots—Damp weather, fog.
Rising flakes which remain high—Wind in upper air.
Small stars in winter on bright, clear, sunny days—Snow in a day or two.

It will be well if we write out on a neat card all the indications, so that anyone examining the weather-glass will have the key to the meaning of the different appearances.

HOW THE FARMER ENLARGED THE FOLD

WE read on page 4293 of a farmer who had a fold made of fifty hurdles that would hold exactly a hundred sheep. Later on, as he had a good deal of pasture land, he decided to increase the number of his animals, so he bought another hundred sheep, and this made it necessary that he should double the size of his fold. In order to do this he bought only two extra hurdles, and the farmer's friend who went to market with him was sure that he had made a mistake, for it seemed impossible to him that the size of a sheep-fold made up of fifty hurdles could be doubled by using only two extra hurdles. But the farmer was quite right. In the first place he had made his fold a long, narrow enclosure, with twenty-four hurdles on each side and one hurdle at each end. Then to double the size of the fold he moved one side farther from the other and placed two hurdles at each end instead of one, by this means exactly doubling the size of the enclosure.

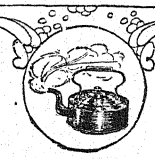
THE NEXT THINGS TO MAKE AND THINGS TO DO ARE ON PAGE 4489.



This picture shows a machine worked by the sun. Hundreds of mirrors are mounted in what looks like a gigantic lamp-shade turned upside down, and the sun's heat-rays are collected by them and reflected on to a large glass tube with a boiler at the end, where the heat turns water into steam.

HOW HEAT WORKS FOR US

CONTINUED FROM 4314



WE know that when things are hot they have power in them which can be used. The most famous case of this—which, according to the story at any rate, set a great man, James Watt, thinking—is the case of the lid of the kettle of boiling water. The heat that is put into the water has the power of making the lid move. Now, if heat applied in the form of steam can make the lid of a kettle move, why should it not start motion in something that is attached to a wheel? The answer to this question is supplied by every engine that is driven by heat all the world over to-day.

On the other hand, just as heat can do work, so work can make heat. One of the old ways of lighting a fire was to rub together two pieces of dry stick, and that produced heat enough to make a spark. In the same way, anyone can prove that heat can be produced by work if he rubs his hand on his coat.

The work of rubbing or striking a match puts heat in it, and when it is hot enough it catches fire. In a word, the kind of motion which we call heat can be turned into ordinary kinds of motion, like that of a wheel or the lid of a kettle; and ordinary mechanical motion, as it is often called, can be turned into the special motion called heat. It is worth while to know the simple way in which this may be stated in scientific language. The Latin word for a mass is *moles*, and from that we get the word *molecule*, which means a little mass. Now, when a thing which we can see—such as a match, or our hand, or a wheel—is in motion, we may call that a case of *molar motion*—the motion of a mass. But heat, which is a case of the motion of the molecules of things, may be called *molecular motion*. So we may say that molar motion may be turned into molecular motion, or molecular motion into molar motion; in other words, work may be turned into heat, or heat may be turned into work.

The importance of understanding this rightly in our thinking is very great indeed. Heat and work sound such very different things. It is true that we can get work out of heat, and heat out of work. There does not appear to be any particular reason why there should be any fixed relation between the amount of heat to be got from a particular amount of work, or the amount of work to be got from a particular amount of

heat. It sounds as if work and heat were two such different things that they could not well be measured against each other. But if we think of heat as molecular motion, and of work as molar motion, then it seems reasonable that one kind of motion should be turned into the other, and also that there must be an absolutely fixed amount of either kind of motion that can possibly be got from the other kind. If that be not so, some motion is being got out of nothing, or some motion is being made into nothing; and we are sure that neither of those things can happen.

What we have just been saying makes the basis of a very great and important science called *thermo-dynamics*. We might translate that "heat-force"; and this great science deals with all the relations that exist between heat, on the one hand, and power, on the other hand. This science bears not only upon the making and working of all machines made by men, but it bears upon the history and the future of the living and eternal machine which we call the universe, and which is made from everlasting to everlasting by God.

A LAW OF SCIENCE THAT WAS PROVED AFTER TWO THOUSAND YEARS

The great law of the conservation of energy has been established in modern times by the study of heat and work. Before the birth of Christ, great thinkers guessed that what we now call the law of the conservation of energy must be true; but the proof of its truth had to wait until the nineteenth century after Christ, and depends upon whether the amount of work we can get from a certain amount of heat, or the amount of heat we can get from a certain amount of work, is absolutely fixed.

Later still, we have begun to see why this must be as it is, because we see that, after all, what seemed to be such a mystery is only a case of changing one kind of motion into another kind of motion, and that is the thing we see and do for ourselves every day.

Less than a hundred years ago, a celebrated Englishman, named Joule, proved, by experiment, that there is a certain amount of work which can be got out of a certain amount of heat; and nowadays we use "J," the first letter of his name, to mean the amount of work which can be got out of a certain known or measured amount of heat. Thus, we take the amount of heat which can raise the temperature of one pound of water at 60 degrees Fahrenheit up to 61 degrees Fahrenheit, and we find that that amount of heat is equal in power to raising 778 pounds through a height of one foot, or one pound through a height of 778 feet. But what the exact figure is matters nothing at all, compared with the great and all-important fact that there is this relation.

HOW HEAT CAN BE CHANGED INTO WORK, AND WORK INTO HEAT

The first law of this part of science is, therefore, that between heat and work there is a constant relation; that either can be transformed into the other. But there follows a second great law which says that, though the first law is true, yet heat will only travel from a body that is higher in temperature to one that is lower.

The first law is another form of putting the law of the conservation of energy, but the second law says that, though energy is never lost, yet there are only certain conditions under which we can use it so as to get work done. The energy may be there, but it may not be available, and that is true of all heat wherever it is found, except where it can flow to something that is less hot. For practical use for doing work, it is not sufficient that energy be not lost; we must be able to get at it.

Every machine that is run becomes warm, and that warmth is given away to the air around it. Our bodies, which are living machines, though they are also more, are always losing heat to their surroundings, and, indeed, it is a general rule that other forms of energy, such as the chemical energy in our food, or the chemical energy in the food or fuel of an engine, tend to be turned into heat, and the point is that this heat is scattered and cannot be used again.

THE MACHINE THAT GIVES HEAT WHEN WE WANT IT TO GIVE WORK

First, let us see how this affects the engineer. It means that when he makes and uses a machine from which he wants to get work, only part of the energy which he puts in comes out as work, and much of it comes out as heat. This heat is not only useless, as a rule, but worse than useless, and causes endless trouble in order that it shall not make

the engine so hot that it will not work. Also, the question of cost comes in, because all the fuel has to be paid for, but only a small portion of the power in the fuel is turned into the work which we want to get out of it.

The world, as we know, is at present living upon its supply of coal, and doing so at a tremendous rate, but far less than one-tenth part of the energy contained in that coal, and put there, so to speak, by the sun, is really used by mankind. The rest is frittered away into the air as heat, and simply wasted.

THE GREAT WASTE OF ENERGY THAT GOES ON IN THE WORLD

An open fire is, perhaps, the most wasteful of all ways of transforming energy, but, at any rate, the heat produced is of some use for the time. Now, if we look at any of the engines which are at work all over the earth, we find that they can all be studied from this point of view. How much of the energy put into them comes out as work, and how much is wasted as heat? We are not far wrong if we say that one-tenth of the energy put in is used, and nine-tenths are wasted.

Anyone who could invent a machine that would turn into work all the energy put into it, or half, or one-third, or one-quarter, would soon be the richest man in the world. So important is this question that there are, of course, everywhere men working at it. The word they use is "efficiency," and their business is to try to increase, even perhaps by only one per cent., or less, the efficiency of the engines at which they are working—that is to say, the proportion of work they do compared with the amount of heat they produce which is useless.

THE SECRET OF POWER IN OUR MUSCLES WHICH NO MAN CAN DISCOVER

The most efficient engine in the world is a living muscle, but the secret of its efficiency has yet to be discovered. Even a muscle, however, does not turn into work all, or even half, of the energy supplied to it; the rest is turned into heat, though this heat has to be looked at very differently from the heat produced, say, in the engine of a motor-car, for it keeps our bodies warm, and maintains them at the temperature at which we can best live. Both on the score, then, of its pure efficiency in terms of work, and its usefulness in regard to the heat produced, a muscle is immensely superior to any machine ever made, and that is to say nothing of its powers of lasting and repairing itself.

But this question of the production of heat by machines, though it is of deep practical importance to mankind, is of even greater importance in another way. It is not only machines that tend to turn useful energy into heat that cannot be used *again*—even if it be useful at the time—in the sense that the mill-wheel cannot run with the water that has passed. All the changes of energy that we can discover seem to follow the same course.

Nearly all chemical changes produce heat, and that heat is scattered and lost. Every kind of motion, besides the motion of machines, is in some degree turned into heat by friction, and that heat is scattered and lost. And therefore we have to learn a new idea which goes along with the great truth of the conservation of energy, and must always be remembered together with it—this is, that though no energy is ever lost to the world, so to speak, it may very easily be lost to us.

THE HEAT FLOWING FROM THE SUN AND FOR EVER PRODUCING WORK

We may classify all sorts of energy, indeed, according to their usefulness for us, and then we discover that it is the general tendency for energy to be *degraded*—to fall in the course of its changes from a more useful to a less useful class. The general end of these changes tends to be that the energy is degraded to the lowest class of all—that of scattered heat, which we cannot use at all. An instance of energy in the highest class is furnished by the energy of the sun—a body which is intensely hotter than its surroundings. The flow of heat of this hot body to less hot bodies produces work, just as the downward flow of water from a height may do work.

We have only to consider for a moment what happens to the sun's radiations to see that, in the course of every change which the power of them undergoes in our bodies or elsewhere, a certain amount is frittered away as heat, and so this energy of the highest class is rapidly degraded to the lowest. We do not suffer, and we are not alarmed, and the reason is that there is always

a fresh supply of energy coming from the sun. But that supply, though it will last a very long time, cannot be endless. Now that we know what *the degradation of energy* means, we must learn the use of another word, first employed by Lord Kelvin, of whose work we read elsewhere in this book. He spoke of what has ever since been known as *the dissipation of energy*. When we speak of a foolish man who dissipates his fortune, we mean that all his money is spent and scattered, and that is what is meant by the dissipation of energy.

WHY WE CAN NEVER GET A REALLY PERFECT MACHINE

Now, we read on page 3888 about the results which would have to follow if the law of gravitation were unopposed, so that by its action the whole of the matter in the universe would all be gathered together into one mighty heap. Just in the same way, the argument now is that all the energy in the universe tends to be steadily degraded and dissipated, taking the form of scattered heat, incapable of doing anything.

If we had a perfect machine we should be able to work it backwards as well as forwards, turning heat into work and work into heat, and never losing anything. There is no such machine, and, according to Lord Kelvin, not even the universe itself is a perfect machine in this sense of the word.

That is to say, it has a bias towards working in one direction, which is the direction of the dissipation and degradation of energy. If this goes on, as it appears to do, the consequences must be tremendous, and we find ourselves led to the same kind of result as we supposed when we imagined that gravitation had nothing to oppose it.

THE RUNNING DOWN OF THE CLOCK OF THE UNIVERSE

If the idea of the dissipation of energy is really true, and the whole truth, it means that the universe must be traveling towards a state of things in which nothing happens—a state which we might describe as the death of the universe. Its matter and energy would still be there, but they would have lost their power of doing anything. Nothing would happen, there would be no life and no motion of any kind. This idea makes us think of the universe as a great clock, made, wound up, and set going. It may run for a very long time, but, like other clocks, it must run down at last. Here we are faced again with the idea of a beginning and an end to the history of the universe. Thus, if we take our solar system as a case in point, we see that, at present, just because the heat-level is higher in the sun than in the planets, heat flows from the sun to the planets, and so on our earth life is possible.

But the spreading out and leveling of the heat in the solar system must some day come to an end, and with it must come to an end not only life, but all the other processes in the solar system which depend upon this difference of heat-level.

The prospect of the theory of the dissipation of energy is that the solar system and the whole universe must, at last, reach a stage in which all the other forms of energy have been degraded and dissipated into heat, and that heat will be spread equally through all the matter of the universe. That would be the end of its history.

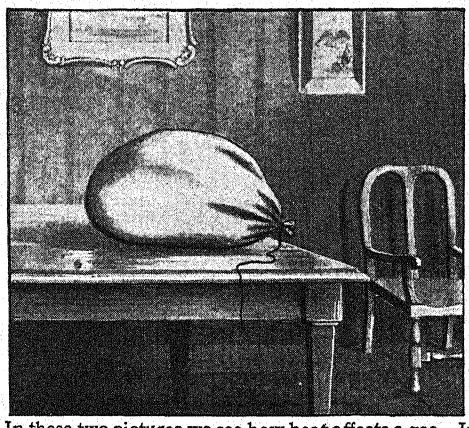
THE WINDING UP OF THE CLOCK OF THE UNIVERSE

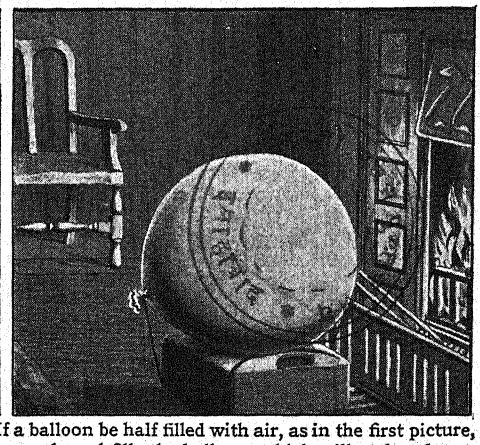
We may slightly change the words of a great student who summed up the case, as it was then thought, at the end of the nineteenth century, and who spoke as follows of the doctrine of the dissipation of energy: This remarkable property of all natural processes seems to lead us to the idea of a definite beginning and to shadow forth a possible end—the interval, which contains the life or history of Nature, being occupied with the slow but inevitable running down or degradation of the great store of energy, from an active to an inactive or unavailable condition.

But, as we study this subject now, we are beginning to see farther and deeper than all but one of the wisest saw in the nineteenth century.

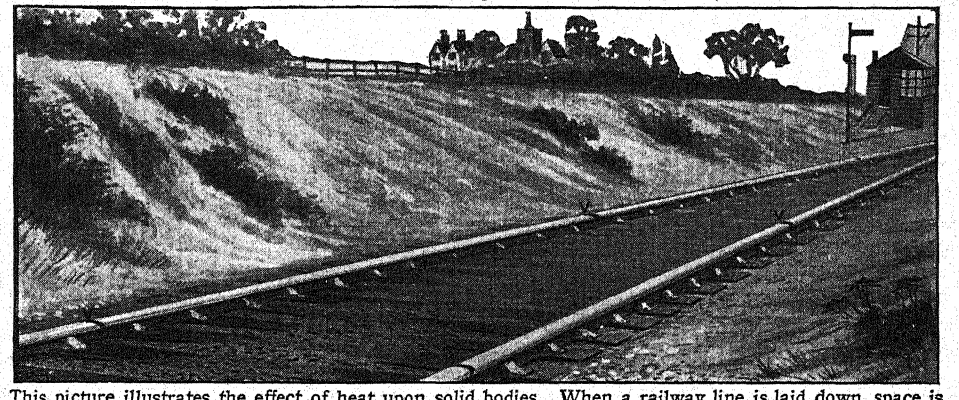
Herbert Spencer stood alone among the great thinkers of the nineteenth century in declining to accept the doctrine of the dissipation of energy. He saw too deeply into the nature of things to believe in the old ideas of beginning and ending, and he saw that the argument for the dissipation of energy was not complete. He declared

HOW HEAT MAKES THINGS EXPAND

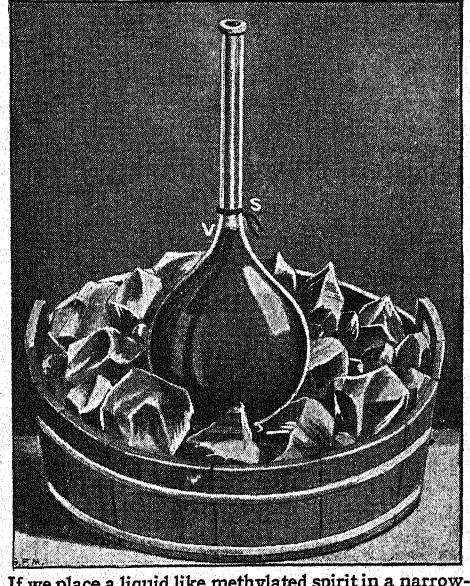


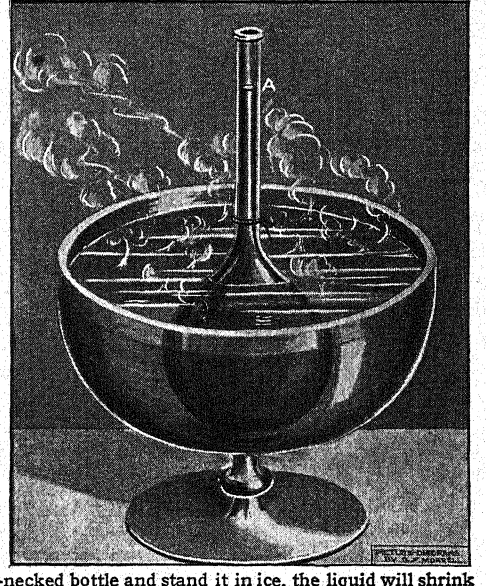


In these two pictures we see how heat affects a gas. If a balloon be half filled with air, as in the first picture, and placed in front of a fire, the air, as it gets hot, expands and fills the balloon, which will at last burst.



This picture illustrates the effect of heat upon solid bodies. When a railway line is laid down, space is always left between the lengths of rail, as indicated by the arrows, to allow for their expansion by heat.



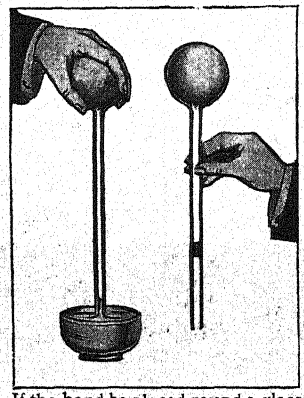


If we place a liquid like methylated spirit in a narrow-necked bottle and stand it in ice, the liquid will shrink from the point S, at which it stood, to V. Now if the bottle be placed in hot water, the liquid will rise to A.

that there must be other processes going on, none the less real, though not so easy to see, which were, so to speak, winding up the clock while other processes, which we could see, were tending to run it down.

Steadily, for some years, the idea of this dissipation of energy, as *completely* true, has been losing credit among those who study these matters, and the deep insight and rare wisdom of Herbert Spencer are beginning to be justified in this respect, as in many another, by the discovery of processes and possibilities in the universe which lead us to believe that it is, indeed, a perfect, an eternal machine, besides being very much more.

The more deeply we study, the more convinced we are that the real answer to this question is the same as the answer lately discovered to the question about the results of gravitation. There we find that what seems to be a process all in one direction, which must have a beginning and an end, is only half the truth; and when we learn the other half, as, for instance, in the study of what we call radiation pressure, we see reason to believe that the universe can go on and on for ever.



If the hand be placed round a glass bulb, the heat of the hand will expand the air in the bulb; but when the hand is slightly removed, the air cools and shrinks a little, so that some water is forced up the tube. If the hand be quite withdrawn and the tube taken from the bowl, the air in the bulb cools and shrinks, and the water in the tube is forced up by the outside air.

Just in the same way we are beginning to discover the processes which act in the other direction, and which will lead us to the belief which we have already stated, the belief of the wisest of all ages, that the universe is from everlasting to everlasting.

We have now learned enough to show us how extremely important is the question of temperature, and by temperature we understand heat-level. It is difference of temperature that gives heat the power of doing work. That difference of temperature means that the heat will flow, and in flowing can be made to do things. Now, what exactly is difference of temperature? Indeed, what is temperature at all? Our first inclination will be to answer that the temperature of a thing is the amount of heat in it, but we shall find that that is not true. It is true that if we take a given amount of a given thing, and add heat to it, it will become hotter; its temperature will rise, and that rise of temperature means in that case that there is more heat in the thing.

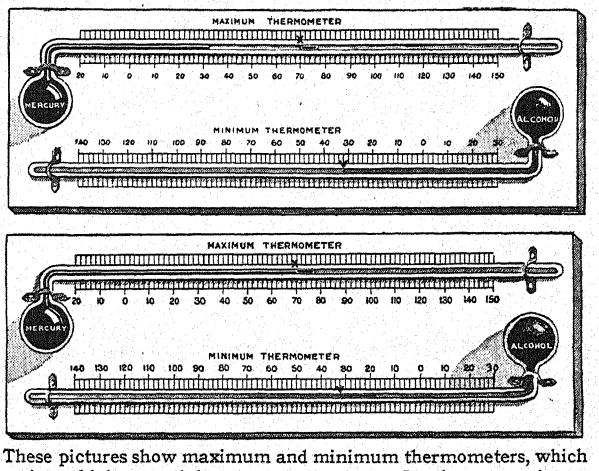
But even if we take a given thing, such as water, we find that to raise a given quantity of it one degree in temperature, at some level in the temperature scale, requires more heat or less heat than to raise its temperature one degree when it is much colder or much hotter to start with than it was in the first case. Then, again, there is much more heat in a large quantity of cool water than there is in a very little water that is hotter, so that again we cannot say that temperature is the amount of heat in a thing. We must think of temperature as if it were like the level of water. Even a little water at a great height, falling into a large lake, has a something about it which the lake has not. For instance, it will turn a wheel. Now, temperature is like the level of water, and has no more to do with the amount of heat, as such, than the mere bulk of water has to do with its power. There is something in the slender waterfall that there is not in the lake below, and that something corresponds to the height from which it falls, and enables it to do work. So the temperature of a thing may be compared to the height from which the water falls in the other case; and, other things being equal, the higher the temperature of a thing, the greater is the work that the thing can be made to do as it cools.

The word *thermometer* really means heat-measurer, but we are now ready to learn that, though the thermometer is called a heat-measurer, it is not a heat-measurer, but a measurer of heat-level. Think of the water falling into the lake, and we see the difference. The thermometer corresponds to an instrument that should tell us the height from which the water fell, but that told us nothing

about the amount of water that fell. The thermometer tells us nothing about the amount of heat, but only about heat-level.

The first thermometer was made by Galileo, little more than three hundred years ago. It was an air thermometer—a glass tube ending in a bulb. This tube was heated and then turned upside down in a vessel of water, as shown in the picture on page 4394. As the air inside the bulb, which had been heated, began to cool, the water ran up the tube.

The air inside the bulb would occupy more space if it were hot, and less if it were cold, and the water would run up the tube in more or less degree accordingly. So by the height of the water something could be told about the temperature of the air. Now, directly we consider this we shall see, from what we have already learned, that this instrument was a barometer as well as a thermometer, for the water was partly pushed up by the air.



These pictures show maximum and minimum thermometers, which register highest and lowest temperatures. In the upper picture the minimum thermometer is at 32°, the lowest point reached overnight. The alcohol carried the indicator, V, to this point, and left it there when the temperature rose, as in the lower picture. In the maximum thermometer of the lower picture, the mercury is at the supposed highest temperature of a day. It has pushed the indicator, X, to 70°, and when it shrinks to a lower temperature, as in the upper picture, the indicator is left at 70°. The indicators mark the highest and lowest temperatures reached.

In this, its first form, the instrument was not, therefore, very useful, for no one could tell to what extent it was measuring the pressure and to what extent it was measuring the temperature of the air. What was required was to close the tube altogether after heating it, so that the atmospheric pressure should have no effect upon what happened inside it. This was not done until half a century after Galileo's first work. At this time, instead of water, alcohol was used. In 1670 mercury was first used.

If we wish to make an ordinary thermometer, then, we take a fine tube with a bulb at one end, and fill the bulb and part of the tube with mercury. Then we boil the mercury. This means that part of it forms a vapor, which travels up the tube and pushes away the air in front of it. While this is going on, we close the end of the tube, and allow the mercury to cool. A practically empty space is then left above the level of the mercury in the tube, and if the mercury has any reason to expand or to contract, it will be able to do so freely in either direction.

The hotter mercury is, the more it swells, and the more space it takes up; the colder it is, the smaller the space taken up. Therefore, the level of the mercury in the tube tells us how hot it is. The higher it is, the hotter it is; and the lower it is, the colder it is. We shall notice that this is just the opposite of Galileo's air thermometer, for in that the colder the air inside, the higher stood the column of water. The really difficult and important part of making a thermometer is yet to come, because we have to find what height in the mercury of the tube corresponds to a certain temperature. It would be no use having a thermometer that was wrongly marked, especially if it is wanted to measure differences in temperature that are very small.

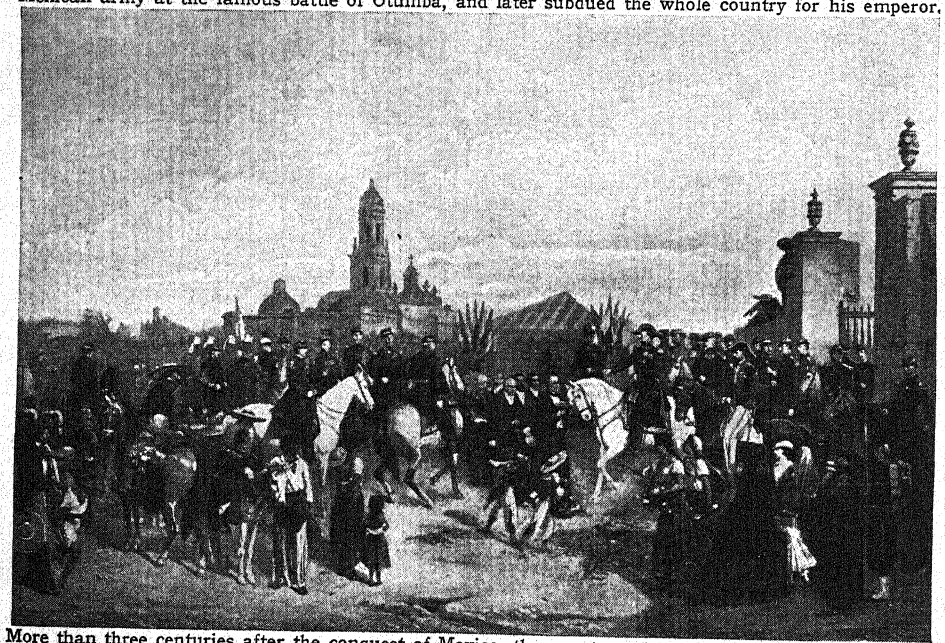
Notably does this apply to the thermometers used by doctors in order to find out how hot the blood of their patients is, for in such a case the differences in temperature are quite small, but may have very large meanings when the doctors are led astray. Nowadays, therefore, great skill and trouble are employed in testing all except the very cheapest thermometers.

THE NEXT PART OF THIS IS ON PAGE 4501.

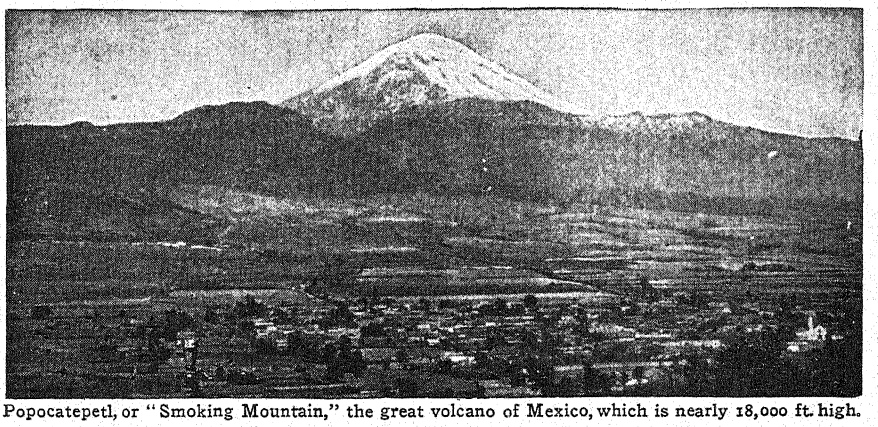
SPANISH AND FRENCH INVADERS OF MEXICO



There is scarcely another story in all history so romantic as that of the Spanish conquest of Mexico in the sixteenth century. With an army of 400 European soldiers and 16 horses, both of which numbers were afterwards slightly increased, Cortes, the Spanish commander, set out to conquer a mighty empire. He had to meet a nation in arms; but, when disaster seemed certain, Cortes, by ability and skill, routed the Mexican army at the famous battle of Otumba, and later subdued the whole country for his emperor.



More than three centuries after the conquest of Mexico, the country was again invaded. The Emperor Napoleon III. of France, making the unjust treatment of foreigners in Mexico an excuse, declared war in 1862, and forced an emperor of his own choosing, the Archduke Maximilian of Austria, upon the country. In 1867, however, the French troops withdrew from Mexico, and, some time after, Maximilian was shot by the republican party. Here we see the French army, under Marshal Bazaine, entering the city of Mexico.



Popocatepetl, or "Smoking Mountain," the great volcano of Mexico, which is nearly 18,000 ft. high.

MEXICO AND CENTRAL AMERICA

CONTINUED FROM 4308

SOUTH of the United States, but still a part of the continent of North America, lie Mexico and Central America, seven states in all, besides a bit of territory which is a part of the British Empire. Below them are the many countries of South America, of which you may learn elsewhere. All except Salvador are washed both by the Pacific and the Gulf of Mexico. That tiny country lies on the Pacific alone.



ARMS OF MEXICO

Let us look carefully at the shape of the gulf into which the Father of Waters, the Mississippi, and the Great River of the North, the Rio Grande del Norte, pour the southern drainage of North America. The two peninsulas of Yucatan, which is a part of Mexico, and Florida shut it in like doors, and Cuba lies between them, like a sentinel in the way.

Let us notice, too, the way in which the vast bulk of North America tapers through Mexico to Central America. Notice that there are four narrow isthmuses, with bulging masses of land between them. The most important of the four are Tehuantepec, one hundred and twenty-five miles across, and Panama, less than fifty miles across. Then let us think of the mighty mountain chain stretching, under different names, for thousands of miles from Alaska in the far north, to the extreme tip of the pear-shaped southern continent. There are many volcanoes in this long chain, especially about the middle of it, in Mexico and Central America. At Panama the great heights sink to about 3,000 feet, and the pass, or saddle, between these low mountains is less than 300 feet high. Through it the Panama Canal has been cut. To the west of the mountains lies the vast expanse of the Pacific Ocean, which is now joined to the eastern waters by the great canal.

Four hundred years ago no one could have given this simple description of the position of Mexico and Central America. Columbus died fully believing that the land he discovered was part of Asia. By degrees, his successors, cruising about the low-lying shores of the gulf and the sea, caught glimpses of the ocean beyond. They sought, ever in vain, to find a way for their ships through the narrow neck of land to that ocean, and the truth came to them. They were not on the fringe of Asia, but on a great continent which lay between them and their desires. How one envies them the first sight of the Pacific Ocean from Panama!

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THE GOLDEN LAND THAT LAY BEYOND THE WESTERN SEAS

Wonderful rumors, spread by these adventurous spirits, soon reached Cuba, one of the first islands settled by the Spaniards. There were stories of massive temples and great stone idols; of large towns with thousands of busy workers; of people with rich clothes and great possessions in gold and silver and jewels.

All these, they said, were to be found inland from the shores of the gulf. Daring deeds were daily occurrences in the sixteenth century, but one of the most romantic and desperate expeditions ever planned and carried out was that of the brilliant Spanish commander, Cortes. He started out to test the truth of these rumors, and to annex whatever he might find for Charles the Fifth, who was also king of Spain, as well as emperor.

The stories we have of his forces do not all agree. We know that he set out from Cuba in ten or eleven ships in November, 1518, and that he had several hundred Spaniards with him. Some say that there were only 400, and some say there were nearly twice as many. He had a few horses, and a few cannon. Truly, it was a small force to conquer an empire.

Cortes did not land until March of the next year. The ships, the horsemen, the cannon made the natives think that the white men were gods. The town of Vera Cruz (True Cross) was founded.

THE WONDERS OF THE LAND TO WHICH CORTES LED HIS MEN

The story of a great empire inland made Cortes determine to take possession of its riches. He burned all his ships except one so that the men could not think of deserting him. First he conquered a ruler near by and made an ally of him. Then with his few white men, and many more natives, he set out toward the city of Tenochtitlan, which we now call Mexico.

The way was hard, but the leader was determined, and brushed aside all difficulties. On and on the party toiled from the hot, unhealthy land by the sea, with its tangle of tropical vegetation, up the rugged country which leads by high terrace steps to the great plateau of Mexico, 7,000 feet and more above the level of the sea.

Montezuma II, the ruler of this fair country belonging to the Aztec tribe of Indians, had more than once sent presents and messages to Cortes, begging him to go away. But Cortes went steadily on till he reached the city of Tenochtitlan on the great lakes that lay in the midst of the plateau.

THE TERROR OF THE AZTECS WHEN THE WHITE MEN CAME

Just as the Indians on the coast, the Aztecs were terrified at the pale faces of the Spaniards, at the horses and guns, none of which they had seen before. They seem almost to have believed that Cortes was the white war-god of their legends come back as he had promised centuries before, for the guns appeared to them to flash lightning, and the horses to travel like the wind. General Lewis Wallace's book, "The Fair God," tells the story.

It was not long before Cortes got Montezuma entirely into his power. It seemed as if all were about to be peaceably arranged for the transfer of the country and its government. Just then an Aztec general attacked some men whom Cortes has left at Vera Cruz and killed some of them. This showed that the Spaniards were not gods, and the people grew restless. Cortes had to return for a time to Vera Cruz, for a jealous official in Cuba had sent an army to punish Cortes for disobedience. Cortes defeated the army and enlisted the soldiers in his own army. While he was gone the people rebelled against Montezuma and the Spaniards. Cortes returned only just in time to save his forces from utter destruction.

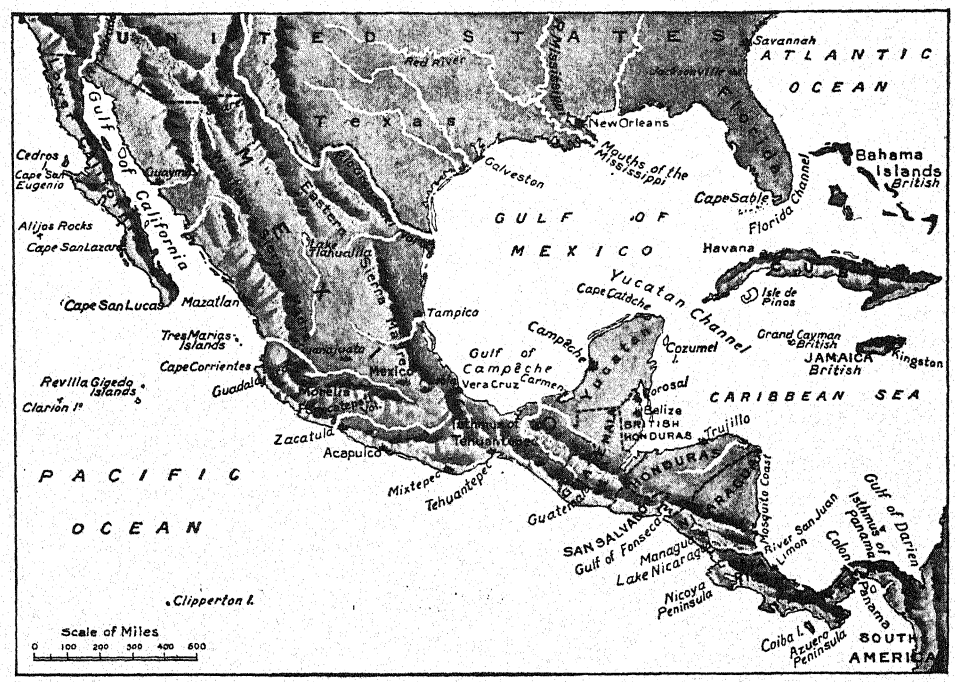
Montezuma, a prisoner, was persuaded by the Spaniards to speak to his subjects, and urge them not to attack the strangers. An impressive sight he must have looked standing on the flat roof of the palace, dressed in his blue and white mantle, his blazing jewels, fine crown, and golden sandals dazzling in the sun. But the furious people, refusing to listen longer, flung arrows and stones in a great tumult. Montezuma — their king — was fatally wounded during this encounter. The day after his death, when things looked black indeed for the Spaniards, Cortes cut his way out of the capital in the darkness. This was known as the "sad night." Men and horses perished on the narrow path by the waters of the canal and lake, and, when the remnant gathered together in the country beyond, Cortes wept tears of despair.

But the genius of the leader shone only the brighter for this check. Somehow he managed to rally his forces, and within a week he utterly defeated the brave Aztecs, who came out to withstand him. They fled in confusion, more than ever convinced that he must be a god, and not a mere man. This was July 7, 1520. The next year, by means of help from neighboring tribes, and by unheard-of efforts in organizing an army and arranging for its supplies, the beautiful plateau of Mexico, with its ruined capital, Tenochtitlan, fell under the power of Cortes. When the town rose again by the lake, it was as the City of Mexico.

The country, for a while, was put under military rule, and became part of the huge dominions which so oppressed the weary emperor, Charles the Fifth. Cortes was not content with these successes. He made many explorations in Central America, always hoping to find a way through to the Pacific.

More colonies for Spain were founded, in Yucatan and Honduras, and in other parts of the land, whose secrets were revealed by the energy of the great commander and his officers. Cortes even pushed up the long, narrow Gulf of California, and before long the Spaniards had also found their way far beyond the plateau of Mexico in all directions. Cortes himself was badly treated by Charles the Fifth, and died in Spain alone and almost forgotten.

The history of the peoples whom the Spaniards found in Mexico and Central America has not yet been fully unraveled. Scholars are still at work studying the wonderful ruins of temples that are discovered from time to time, the carvings on great stone idols and altars, and the picture writing on various relics. Some of these we can see for ourselves in museums, and interesting it is indeed to trace resemblances in them to the work of other countries, such as Egypt and Babylonia and China.



Mexico and Central America, the link that joins two great continents.

THE MYSTERY OF THE FIRST PEOPLE WHO SETTLED IN AMERICA

Where the first people came from to settle in America, we know not, but the remains found on the soil show that, through the long centuries before the vast lands were discovered by Europeans, different races of people had lived and died on them for generation after generation. Sometimes they destroyed the works of those who went before them; sometimes they grafted their own works upon those of their predecessors.

The first people around the City of Mexico that we know anything about were the Toltecs, who seem to have ruled about 300 years. It was about 1064 they were defeated and driven south by the Chichimacs, who built cities and lived in them. Next come seven tribes of the Nahua stock. The Aztecs were one of these and finally gained the power over the others.

Further south in Yucatan, Honduras and Guatemala, and other states, the Mayas lived. They were great builders, and the ruins of some of their houses can be found to-day. They had a written language and by good luck some of their books yet remain. When Cortes went to Honduras, he passed, all unknowingly, a wonderful palace of the Mayas, hidden by the thick growth of trees and shrubs.

The civilization of the Aztecs was remarkable in many ways. They were not as good builders as the Mayas, but some of their palaces and temples were very large. They did not know iron, but their workmen did wonderful work in gold, silver, copper and tin. They had a system of picture writing, and had large schools. They had learned the use of cotton and wove cloth of it. Their religion demanded human sacrifices.

THE GREAT ZEAL OF THE SPANIARDS TO CONVERT THE HEATHEN AZTECS

As we know, the Spaniards classed the natives they found in the New World all together under the mistaken name of Indians. Now, the civilization and conversion to the Christian faith of these so-called Indians was one of the chief objects of the Spanish conquerors. Bands of devoted missionaries went out from Europe to the new possessions to teach the natives to give up their wild, roving life and the heathen customs of their religion, such as offering human sacrifices to idols.

Cortes himself did his best to persuade Montezuma to accept Christianity, but the Aztec chief was only puzzled by the new ideas so hastily thrust upon him. Everywhere, in the first zeal of overthrowing heathenism, idols and temples, inscriptions and carvings were cast down, buried, defaced; so that the task of finding out the truth about the past has been made even harder than it might have been. Enough has been saved, however, to enable the wise men to tell us a great deal about them, and their beliefs.

THE SPANISH GOVERNMENT OF NEW SPAIN

Soon after the news of Cortes' discoveries reached Spain, people began to come out, but the actual number of white men in any of the Spanish colonies was never large.

As the years passed on, the native races settled down—after many difficulties—to the new religion and new rulers. The new teaching seemed very strange to the simple-minded Indians, and the priests had much difficulty in explaining the Christian religion to them. They were much hindered by the reckless searchers for gold, many of whom were cruel and selfish and did not regard the rights of the Indians.

Mexico, together with Central America and the West Indies, was called New Spain. It was ruled by a viceroy, who was almost always sent out from Spain. Between the appointment of the first, in 1535, and 1821, when Mexico gained its independence, there were more than sixty of them, and only two or three had been born in Mexico. The priests taught the people agriculture as well as religion.

Many beautiful towns were founded after Spanish models, with Spanish names and fine cathedrals; schools and colleges rose up in them, and Spanish families went out to make new homes in the Far West.

Roads and bridges made travel and trade easier. As agriculture was extended and improved, mining was developed, and the raising of cattle then became an important industry. Great tracts of land were given to favorites, and sometimes a man could ride all day on his own land.

Both Mexico and Central America still offer vast possibilities in all these directions. Round the tropical lowlands, rice, sugar, cocoa, and cotton grow easily. On the rising terraces, coffee, maize, and tobacco find suitable conditions, and wheat-fields lead up to the grassy downs, which make good pasture land for the cattle and the splendid horses, for which the country gradually became famous as the years went by.

THE VAST NATURAL RICHES FOUND IN THE FORESTS AND MINES

The magnificent forests abound with every valuable kind of tree, from the rubber tree to the mahogany. As for the mines, Mexico is rich in various kinds of metal—silver, gold, copper, and lead,

among many others. Sulphur is obtained from the crater of the smoking mountain, Popocatepetl. Another remarkable volcano is Jorullo, thrown up by an earthquake in a single night in 1759, from fertile fields of sugar and indigo.

The Indians did not like to work, and some negro slaves were brought in, but not many, for the climate did not suit them.

In time, many Spaniards intermarried with the natives, particularly in Central America; and so many great men of these countries are descended from the conquered, as well as from the conquerors, and a large mixed nation has grown up, with a certain number of pure-blooded Spaniards at the top of society, and many natives "of no account" at the bottom. New Spain gradually came to include nearly all the country round the Gulf of Mexico, and reached out northward to California, though the outlying districts were very thinly peopled.

Spain ever needed all she could get out of her distant provinces, for her wars at home were constant in the seventeenth and eighteenth centuries. Under some viceroys the taxes were excessive, and the people were oppressed in order to send riches to Spain; but under other viceroys the rule was milder, and sometimes even indulgent.

How Hidalgo began the struggle that ended in Mexico's freedom

As time went on the white men born in Mexico thought it wrong that all the high offices should be held by men born in Spain. They had heard, too, of the American Revolution, and of the French Revolution, and some determined to be free. When Napoleon made his brother Joseph king of Spain, the officers did not know which king to follow. In 1810, Hidalgo, a parish priest, started a rebellion, but it was put down, and the heads of Hidalgo and the other leaders were cut off. Another priest, a pupil of Hidalgo, named Morelos, then raised another rebellion, but he too was captured and executed in 1815.

The sad end of the heroes who tried to set Mexico free

The people who lived in those times no doubt thought Hidalgo and Morelos had failed. We who live a hundred years later know that they succeeded gloriously in awaking their countrymen, and preparing the ground for the great struggle that was coming. To-day they are honored in Mexico, and a state has been named in honor of each of them.

But the idea of independence was not dead. The fighting continued and all began to feel that separation was sure to come. Finally Vicente Guerrero, the chief of the rebels, Iturbide, a Royalist general, and the new viceroy met and agreed that Mexico should be independent under a king from Europe. No one would consent to take the throne, and so Iturbide had himself proclaimed emperor in 1822. The people refused to accept him and the next year he resigned. In 1824 the Republic of Mexico was set up.

Iturbide, who was the son of a Spanish nobleman, had been ordered to live abroad, but some of his friends persuaded him to return to Mexico, saying that the people really wanted him to be emperor. When he reached Mexico he was arrested and shot. In later years the Mexican people came to see that though he had been ambitious, he was really the man who had freed Mexico from Spain, and now he is called "Liberator of Mexico."

A time of war and confusion

The new republic had a hard time. The people had never had the opportunity to learn how to govern themselves, and there was little peace or order. Ambitious men struggled to become the head of the new state, and there was constant fighting. The man who won the presidency seldom could hold his place as long as a year. Some of the rulers called themselves dictators, but their power did not last, either.

The most powerful man in all the period of confusion was Antonio Lopez de Santa Anna, who was sometimes on one side and sometimes on the other, but always for himself. He gained fame by driving out a Spanish army which was trying to bring back Mexico under Spanish rule. In 1833, he became president for the first time, just when the question about Texas was to be met.

It was about that time that troubles began with Texas, on the Gulf of Mexico. No one was at all certain about the boundaries of Texas. Some said it was really a part of the Louisiana Purchase, and so belonged to the United States, but it was generally thought to be a part of Mexico. At the time Mexico began to

fight for her independence only a few white traders, missionaries and hunters lived there. A little later three hundred families went from Mexico to colonize it, and a large number of Americans also settled there on grants of land. More and more Americans came and the rulers of Mexico became frightened and forbade any more to come in. An insurrection against the oppressive Mexican government broke out, which ended in the Texans becoming independent in 1836. Santa Anna was captured and agreed to do all he could to make Texas independent. In spite of this the Mexicans made three attempts to conquer the new republic. Finally, in 1845, the United States listened to the request of Texas to make it a state of the Union.

THE WAR BETWEEN MEXICO AND THE UNITED STATES ABOUT TEXAS

We remember that many people in the United States were against this union, because the laws of Texas allowed slavery; also many people in the United States thought a war with Mexico would follow if Texas were annexed, as Mexico had never given up hope of reconquering the new republic. These opponents were soon seen to be right, and Mexico and the United States were quickly at war.

The Mexican War did not last very long. The American troops were well armed and disciplined, and fought steadily. The Mexicans were brave, too, but they were badly led. During the two years of war twelve different men tried to rule in Mexico. You can see that with such frequent changes in the government, the generals would not know what to do. The Americans were victorious in every battle. Vera Cruz was taken, beautiful Pueblo, with its many-colored tiles glittering in the sun, fell without a blow; even Mexico, the capital, was occupied, after the hill of Chapultepec, so connected with old Mexican history, had been taken after a terrific struggle.

After peace had come to the long-distracted country, there was a short time of quiet, when reforms were beginning to take effect, and then troubles came again. President Juarez saw that the state of the country was so bad that it could not pay its debts at that time. He was not very polite about it, and offended the European nations which held the most of the debts. Three of them sent armed forces to protect their rights, they said. England and Spain soon withdrew their remonstrances, but Napoleon III, wishing for military glory, managed to set up a European prince, Maximilian of Austria, brother of the Emperor Francis Joseph, as emperor of Mexico, to be supported by the arms of France.

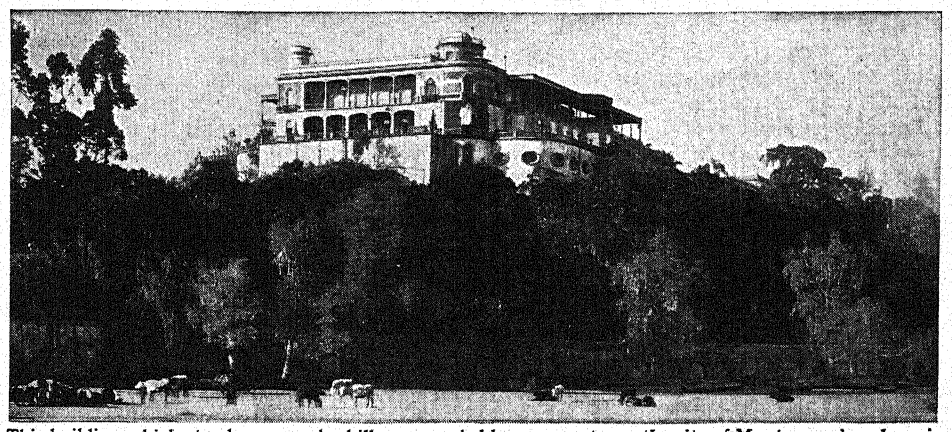
His short reign of three years is indeed a tragic story. With his young and charming wife, Maximilian set up a gay court in the beautiful palace, restored and furnished in grand style, on the famous hill of Chapultepec. The National Museum in the city close by holds the heavy silver plate, the great glass coach, and many other gorgeous reminders of the brilliant days that passed like a dream, with dinners and dance, and fêtes under the fine trees and among the wealth of sweet roses. The native President Juarez withdrew on Maximilian's entry to the north of Mexico, and bided his time. Suddenly there came a crash. The United States had been occupied with the war between the North and the South while Napoleon III made his schemes. As soon as it was over, the government hastened to remind France that the countries of Europe had no right to interfere with the nations of the American continent, and that they could not recognize a monarchy in Mexico. Napoleon was afraid to venture on a war with the United States, so he was compelled to withdraw the help in money and soldiers he had promised to Maximilian, to keep him on the throne that he had persuaded him to accept.

AN EMPRESS WHO LOST HER REASON; AN EMPEROR, HIS THRONE

The poor Empress Carlotta rushed off to Europe to try what personal pleading would do with Napoleon and with the Pope, but she could not accomplish anything. The strain and sorrow of it sent her out of her mind, and she never recovered. Maximilian refused to give up the throne or to leave the country. He was taken prisoner and shot.

As the French left the country, and the empire they had created drew to its tragic end, one of the greatest of Mexican rulers was making his way to the front. This was General Porfirio Diaz, who took possession of the capital for the Liberals in 1867. Less than a month later the patient, long-enduring Juarez entered it in solemn state and held the presidency until his death in 1872. Four years after

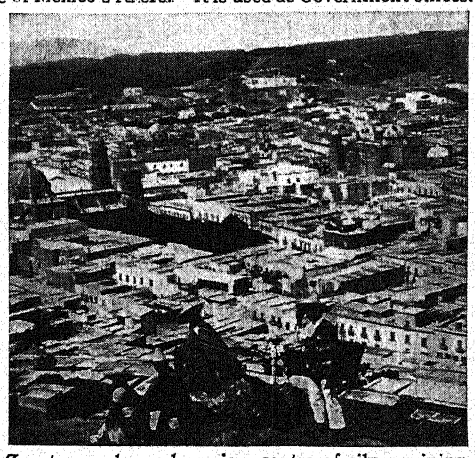
THE CITIES AND BUILDINGS OF MEXICO



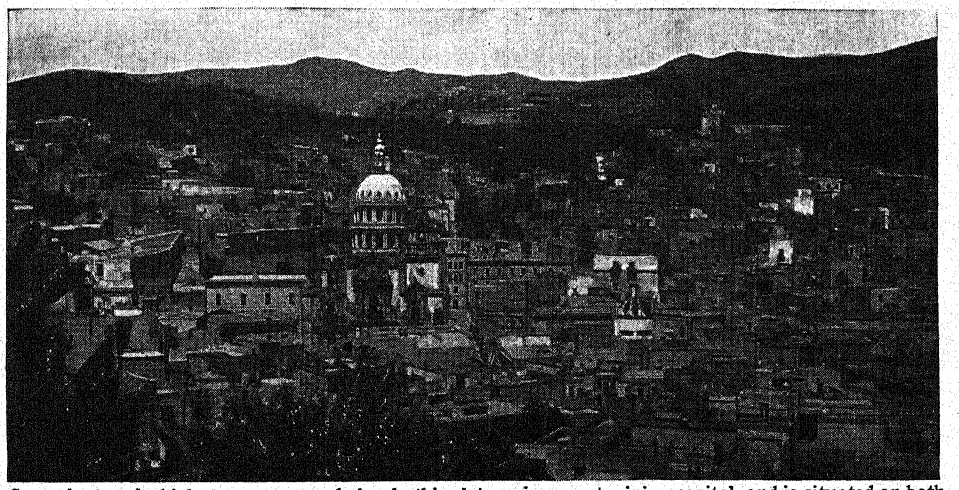
This building which stands on a rocky hill, surrounded by cypress-trees, the site of Montezuma's palace, is the palace of Chapultepec, and was formerly the home of Mexico's rulers. It is used as Government offices.



The splendid cathedral in Mexico city was begun in 1573 and completed 84 years later. Its walls alone cost $2,000,000; inside there are twenty separate chapels.



Zacatecas, shown here, is a centre of silver-mining. On the left can be seen the cathedral, with one ruined tower, damaged by cannon-shots in the revolution.



Guanajuato, of which we see a general view in this picture, is a great mining capital, and is situated on both sides of a deep ravine with a mountain stream running through it, that in rainy weather becomes a torrent.

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the death of Juarez, Santa Anna died, poor, blind, and neglected. Though possessing great bravery and military skill, he had always been turbulent and difficult, and often did his country harm instead of good.

A PRESIDENT WHO HAD MORE POWER THAN A KING

After Juarez's death, Sebastian Lerdo de Tejada served as president, and determined to continue in office a second term, though this was against the law. A revolution broke out, and he was defeated by General Diaz, who was elected president in 1877. At the end of his term a friend was elected, and in 1884 Diaz again became president, and later the law was changed to allow re-election. He continued to serve until 1911, when he was forced to resign. Though called a president he was really a dictator.

Diaz kept order and the wealth of Mexico increased greatly under his rule. Railways and manufacturing were encouraged, new public buildings were constructed, and the harbors were improved. Many men of other nations went to Mexico to develop the riches of the country, and all seemed well with the nation. President Diaz made two great mistakes. He decided everything himself and did not train other men to take the government when he grew too old, and he did not try to have the poor people educated. Though he had much Indian blood in his veins he did not do much for the Indians.

Mexico grew richer, but most of the wealth was held by a very few people. The greater part of the population could neither read nor write, and had no property at all except the clothes they wore. They worked on the land or in the mines, and were nearly all in debt. They could not move to find a better position until the debts were paid, and the wages were so small, that this was often impossible. Sometimes they were cheated by their employers to prevent them from getting free.

REBELLION IS RAISED AGAINST PRESIDENT DIAZ AT LAST

In 1910, a wealthy man, Francisco Madero, who felt that all this was wrong, was a candidate for the presidency. Just before the election he was arrested, and, of course, Diaz was re-elected. When Madero was freed he planned a revolt and soon the north of Mexico was ablaze. The revolution continued to spread, and in 1911, Diaz resigned and went to Europe, where he lived until his death in 1915. Madero went to Mexico City, and when the election was held was chosen president.

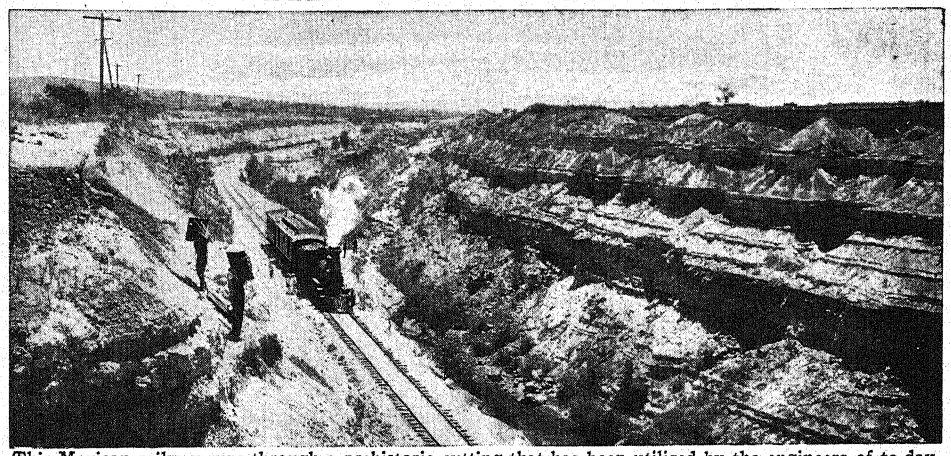
When the iron hand of President Diaz was removed disorder broke out. President Madero was not strong enough to govern, and soon there were three or four men with armies all trying to seize the power. In 1913, revolt against Madero broke out in Mexico City under Felix Diaz, a nephew of the old president, and General Reyes. The commander of the army, General Victoriano Huerta, went over to the rebels, and both Madero and the vice-president were murdered.

Soon General Huerta was chosen president, but the United States would not acknowledge him to be the rightful ruler. A revolt against him broke out in the north of Mexico, and there was bitter fighting. Both sides sometimes took the property and even the lives of American citizens living in Mexico, and President Wilson warned them that the United States might have to interfere. In 1914 an American force was landed at Vera Cruz, and General Huerta was forced to resign.

THE UNHAPPPY CONDITION OF MEXICO CONTINUES

General Venustiano Carranza, the chief of the largest force of revolutionists, now took charge of the government, but he quarreled with General Villa, who was his best soldier, and there was more fighting. For a time four men claimed to control the government. We cannot tell you all the dreary story, for the end has not yet come. General Carranza has more power than any one else, but he has not been able to restore peace everywhere in the unhappy country. Some of the territory is still under the control of bandits. The United States forces withdrew from Vera Cruz, but American soldiers entered Mexico from Texas, and remained there some time. Finally they were ordered back, but soldiers are yet on the Texas side to protect the United States from attacks of robbers calling themselves revolutionists. Many of the mines are still closed, and foreigners are not willing to risk their lives and their money in a country which cannot protect them. The great difficulty is that men are not content to decide questions at elections. The party or the man that loses tries to gain his ends

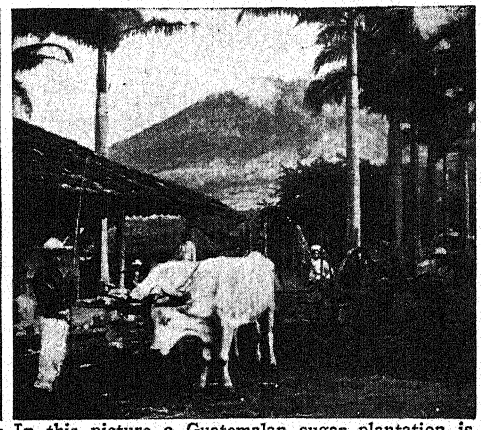
SCENES IN THE SUNNY LAND OF MEXICO



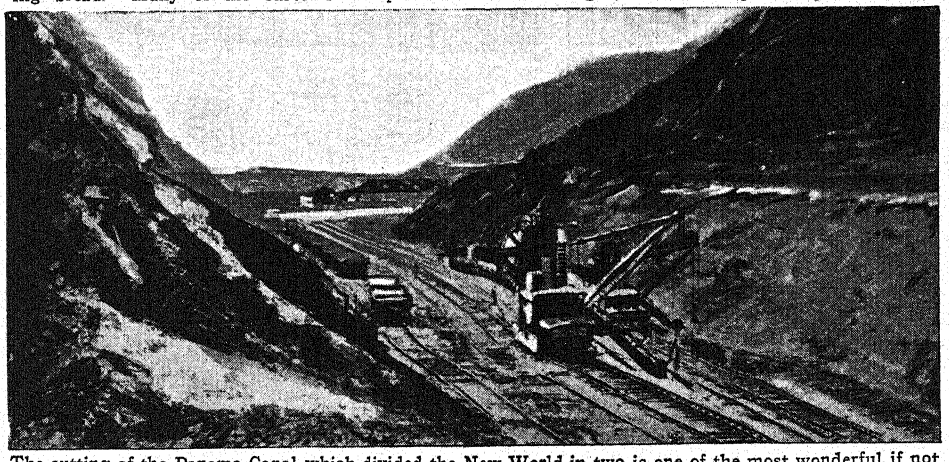
This Mexican railway runs through a prehistoric cutting that has been utilized by the engineers of to-day. The cutting was hewn entirely by hand labor in the old days before Europeans went to Mexico. It is said that the rails are laid on ebony sleepers, and that the ballast used is silver ore from the disused mines of the old Aztecs. The picture shows clearly many different strata of rock and soil laid down ages ago.



Here we see natives of Tehuantepec, who are mostly of Indian blood. The women are making and cooking bread. Many of the customs are primitive.



In this picture a Guatemalan sugar plantation is shown. In the distance we can see the famous Volcano de Agua, with its top among the clouds.



The cutting of the Panama Canal, which divided the New World in two, is one of the most wonderful, if not the most wonderful engineering feat ever attempted. Here we see a very difficult cutting being made through the solid rock at Culebra. Less than a century ago such an undertaking would have been laughed at as a dream.

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by force. So few people are educated that public opinion in favor of good government is not strong. What is to be the future of Mexico no one can say.

WHAT OF THE TERRITORY SOUTH OF MEXICO?

South of Mexico are six little states and a British colony, which are all together known as Central America. Columbus touched this land in 1502, and soon afterward Spaniards came to conquer the territory. Before the work was done, Cortes had already conquered Mexico, and worried and subdued the Indians. For a time all the country was a part of New Spain, but afterward was independent of the Mexican viceroy, and was governed by the captain general of Guatemala. It was divided into five departments which have since become the states of Guatemala, Honduras, Salvador, Nicaragua and Costa Rica. British Honduras is a part of the British Empire.

The Spanish rulers were generally very bad, and tried to enslave the Indians, who were very stubborn. So few white men came out, that they soon intermarried with the Indians. Most of the population is now mixed white and Indian, or pure Indian, though there is some negro blood in some of the states.

The country declared its independence of Spain in 1821, and was united to Mexico under the Emperor Iturbide. When he fell, the Republic of the United States of Central America was formed, and lasted until 1839, when it fell apart into the states we have mentioned. Since that time there have been many attempts to restore the Union, but one or more states have always objected, and a complete union has never been formed. There has been war nearly all the time, except in Costa Rica. This state has a larger proportion of whites than the others and has been quieter. Either the states have fought one another, or there have been revolutions inside the states.

These five were the Central American states for over eighty years, but in 1904, Panama became the sixth. The Isthmus was joined to the Republic of Colombia in 1821, but had been very restless and at times was almost independent. In 1903 it revolted because it feared that Colombia would prevent the digging of the Canal of which you can read in another place. It stretches from Costa Rica to the mainland of South America, but the Canal Zone, through which the Panama Canal runs, divides the country in two.

SOMETHING ABOUT THESE STATES OF CENTRAL AMERICA

Now let us look at the states and see something of them. No one of them is very large, but two are about the size of New York, one the size of Vermont and New Hampshire together, while tiny Salvador is not so large as New Jersey. Panama and Costa Rica cannot agree about their boundaries, and so one cannot say exactly how large either of them is. The population in no one of the states is as great as that of Virginia.

The climate is varied. It is hot in the lowlands near the coast, cool higher up in the hills, and really cold among the mountain tops. There is a rainy season, during which there is a shower nearly every day. A great deal of rain falls in the region, sometimes as much as 200 inches in a year. Much of the soil is very fertile, and almost everything will grow, and some plants yield two crops in a year. Cotton, corn, sugar, rice, tobacco, coffee, and cocoa, besides nearly all the common vegetables, are grown. Bananas, pineapples, guavas and many other fruits grow. There are forests of mahogany, cedar, rosewood, rubber, logwood, and many other valuable trees. Some of our valuable medicines come from Central America, and there are wonderful flowers.

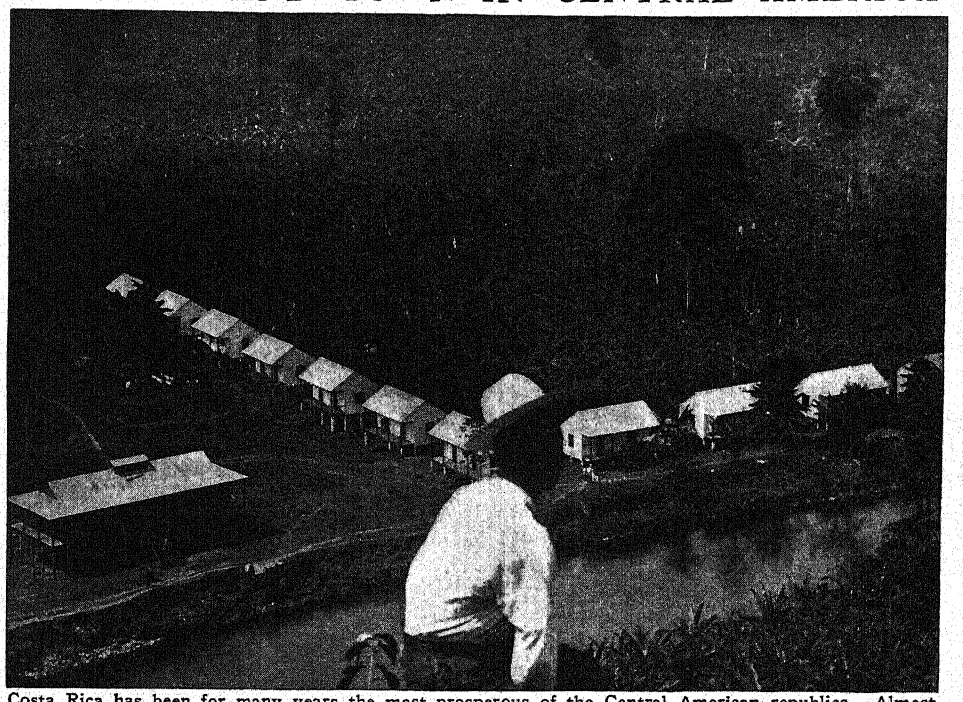
THE BRIGHTLY COLORED BIRDS OF THE TROPICAL FORESTS

The forests contain many birds, many of them with bright plumage. Costa Rica has more species of birds than all Europe. There are many kinds of parrots and macaws, and the curious quetzal, hunted for its tail feathers. In some parts huge vampire bats force the people to keep indoors at night and to protect their animals. There are jaguars, and other large animals of the cat kind, in the forests, besides many queer animals such as the honey-bear, the armadillo, the tapir, and several kinds of wild pigs. Much territory has never been explored by white men.

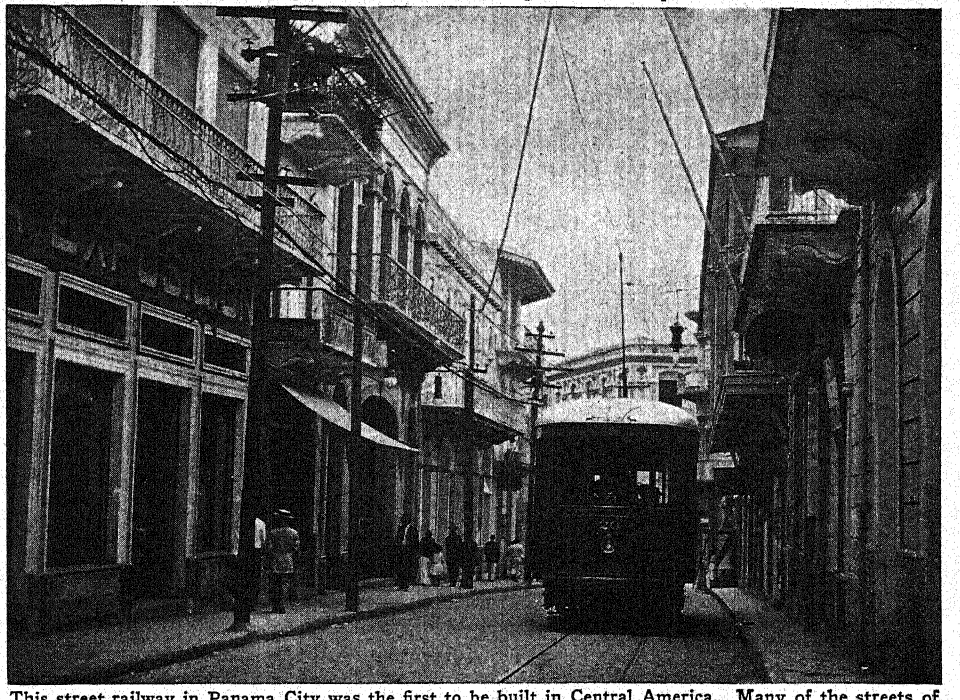
Central America could support a much larger population than at present. It is one of the richest regions on the earth to-day, and if the states only had settled government many more white men would go there to develop the country. Living is so easy that the natives do not work much, and do not get much from the soil.

THE NEXT STORY OF COUNTRIES IS ON PAGE 4505.

COUNTRY AND TOWN IN CENTRAL AMERICA



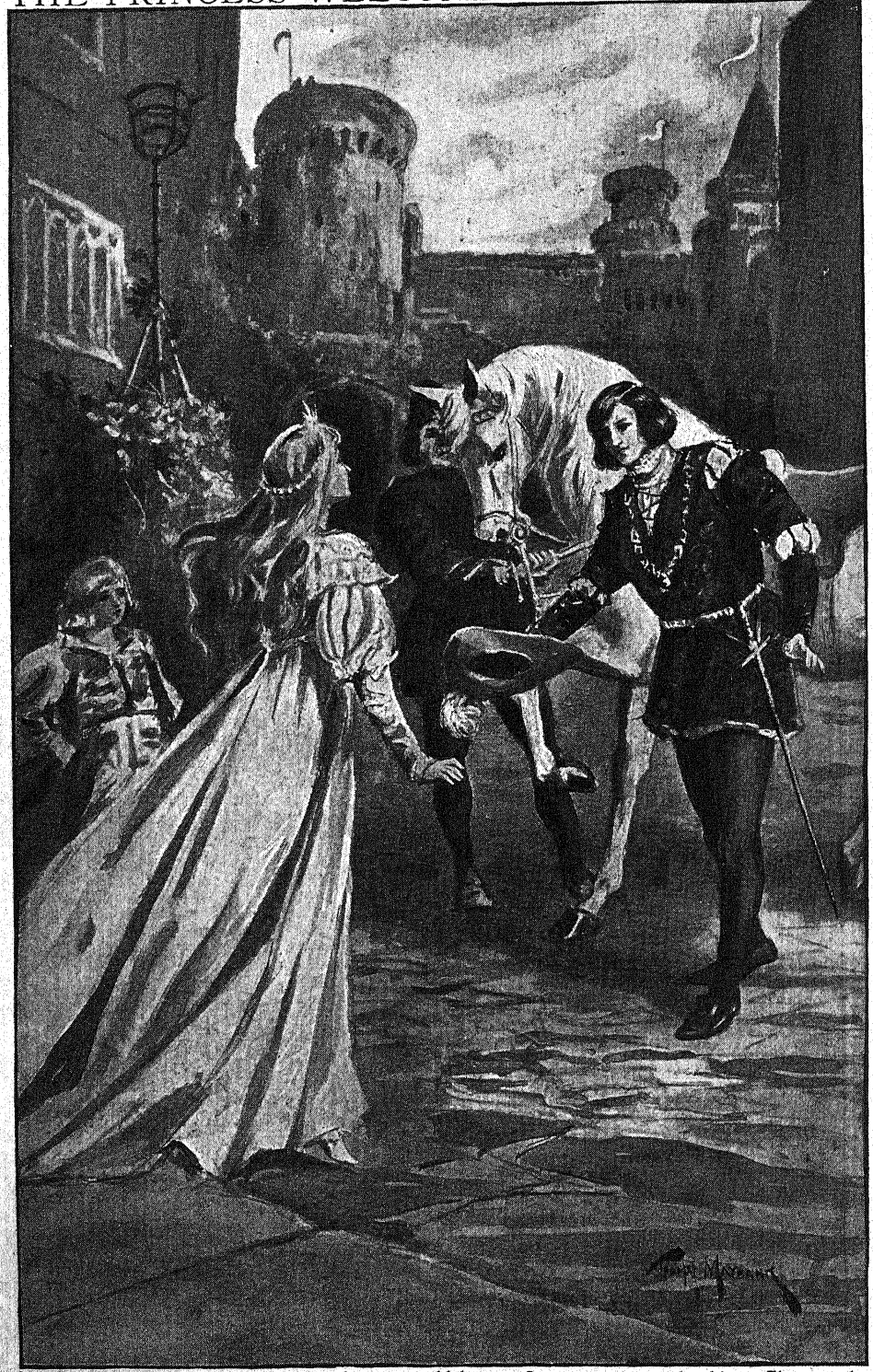
Costa Rica has been for many years the most prosperous of the Central American republics. Almost everything will grow in its rich soil, but coffee and bananas are the principal crops. More than 10,000,000 bunches are exported every year. This is a picture of a banana plantation, with the manager's house and the houses of the laborers along the edge. The largest part of the crop comes to the United States.



This street railway in Panama City was the first to be built in Central America. Many of the streets of the city are so narrow that the car almost blocks them when it passes through. Though Panama is so near to the busy Canal, it still preserves much of the quaint appearance of a city of the Old World.

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THE PRINCESS WELCOMES HER DELIVERER



The young prince rode straight up to the gates, which were flung open to receive him. There at the foot of the steps stood the beautiful princess in her bridal robes, with a smile of welcome in her eyes.



THE WATER OF LIFE

CONTINUED FROM 4347

ONCE upon a time there lived a king who had three sons. One day the king fell ill, so ill, indeed, that the court physician despaired of his life.

As the three young men were walking in the garden, they met a little old man, who asked them why they were so sad.

"Our father, the king, is dying," they replied, "and nothing can save him."

"The Water of Life could save him," said the old man, "if you are brave enough to face the dangers that beset the path of those who seek it."

"I will go in search of that water," said the elder brother, "even though it should cost me my life." And the next day he set off.

Before he had gone very far he found himself in a deep valley, and on a bank by the roadside stood an ugly dwarf in a sugar-loaf hat and scarlet cloak.

"Whither away?" asked the dwarf.

"What does that matter to you, imp?" retorted the prince rudely. Whereupon the dwarf gave a loud laugh, and immediately disappeared. But he was so enraged at such uncivil treatment that he caused a spell to be cast over the valley, and the prince, as he rode forward, found the mountains slowly closing in round about him, until he could not move a single step either forward or backward.

At the palace the two younger brothers were anxiously awaiting the prince's return, fearing some ill, when the sick king became rapidly worse.

"I will tarry no longer," said the second brother. "At sunrise I, too, will go in search of this wonderful water."

The young man was brave, and all went well until he came to the valley.

"Whither away?" asked the dwarf.

"Out of my path, busybody!" replied the young man. "I am in haste, and you will hinder me."

"That I will," replied the dwarf; and he cast the same enchantment upon him.

When neither of the brothers returned, the youngest prince of all determined to start. So at daybreak he set out on his white horse, and rode on till he came to where the dwarf stood.

"Whither away?" asked the dwarf.

"I go in search of the Water of Life," replied the youth. "My father is dangerously ill, and if you can guide me to the place where this magic water lies, I shall indeed be grateful."

"Well spoken!" cried the dwarf. "The Water of Life springs from a well in an enchanted castle. With this rod and these two loaves you may

go in safety. When you reach the door, strike it three times with this rod, and it will fly open. Within are two lions, waiting for prey. But have no fear; throw them this magic bread, and they will not molest you. Hasten to the well, and take some of the water, but see that you do not linger, for at twelve the door shuts, and you will be lost."

Thanking him for his friendly aid, the prince hurried on until he came to the enchanted castle, where he found everything just as the dwarf had said. With the aid of the rod and the loaves, he found no difficulty in entering the castle. In a great hall, the remains of a banquet lay on a table, and the prince picked up a loaf and slipped it into his pocket, and took a sword from a knight who lay asleep and thrust it in his belt.

At the end of the room, partly hidden by a silken curtain, lay the most beautiful girl the young man had ever seen. As he approached, she sat up.

"At last you have come, my prince!" she cried. "For a hundred years I have been awaiting you. Marry me, and the enchantment which is on this castle will vanish."

The prince was only too willing to have such a lovely bride, but he begged her to direct him to the magic well, promising to return in a year. The princess told him, and the prince filled his flask with the precious water, and was soon on his journey home.

In due course he came upon the dwarf, to whom he related his adventures.

"You have done well," said the dwarf. "With that sword you can slay whole armies, and that loaf will never grow smaller, however much of it you eat."

But the prince had not forgotten his brothers, and he asked the dwarf if he could tell him where they were.

"They were proud and ill-behaved," answered the dwarf; "and so I laid a spell on them for punishment."

The prince begged so hard that the dwarf set them free, and the three brothers set out for their father's palace.

One night, while the young prince slept, his brothers began to plot how they might steal the Water of Life. "For," said they, "our father will be so pleased with our brother that he will leave him the kingdom that should come to us." So they stole the magic water and refilled the flask with sea-water.

When they reached the palace, the young man hastened to his father's bedside, and gave him the water. But the sea-water made the king worse than he had been before. Then the elder brothers came forward with the real Water of Life; the king drank of it, and was instantly cured. A great feast was given in honor of the two brothers, but the people were so furious with the youngest son that they succeeded in persuading the king to consent to his death. But soon the old man began to blame himself bitterly for allowing his favorite son to be killed.

"My son! Ah, my son!" he cried. "How could I have been so cruel?"

At these words the servant who had been charged to slay his son fell on his knees before him, and confessed that he had not had the heart to put the prince to death, but had hidden him in a wood.

The king gave orders for his son to be brought to him without delay. But when they reached the wood the young prince could not be found.

A full year had now elapsed since the finding of the enchanted castle, and the eldest brother determined to win the lovely princess and her kingdom. The second prince had the same thought, but he said nothing to his brother.

Now, the princess was determined that none but the rightful prince should share her kingdom, and so she gave instructions for a road of pure gold to be made, leading to the castle gates.

"My prince will ride up that shining path, turning neither to right nor to the left," she said to her courtiers. "When he arrives, admit him; but open to no other."

When the eldest brother saw the golden road, he thought it a pity to spoil anything so beautiful, so he turned his horse and rode along by the side of it. But when he arrived at the gates the courtiers refused to admit him.

By and by the second brother rode up. "What a beautiful road!" he thought. And he, too, rode by the side and was refused admittance.

At last the youngest prince, seated on a beautiful white horse, approached the castle. So anxious was he to see his lovely princess again that he never even glanced at the golden road, but rode straight up to the gates, which were flung open to receive him.

There, at the foot of the steps, stood the princess in her bridal robes, with a smile of welcome in her eyes. The marriage took place without delay, and the prince with his lovely bride went back to his father's palace, where they were received with great joy.

The elder brothers were banished, and when the old king died, the young prince and his bride reigned together.

MERRYMIND, THE LITTLE FIDDLER

A TALE TOLD BY GRANNY'S WONDERFUL CHAIR

ONCE upon a time there lived a certain poor man and his wife, who had thirteen children. Twelve of these children were called by names common in the north country—Hardhead, Stiffneck, Tightfingers, and the like; but when the thirteenth came to be named, either the poor man and his wife could remember no other name, or something in the child's look made them think it proper, for they called him Merrymind.

When the youngest was old enough to look after his father's sheep, there happened the great fair, to which everybody in the country went.

Merchants and dealers from far and near crowded to the fair. The poor man who had the large family could afford them little to spend; but, as the fair was held only once in seven years, he opened the leathern bag in which his savings were stored, and gave every one of the thirteen children a silver penny.

The boys and girls had never before owned so much pocket-money; and, wondering what they should buy, they dressed themselves in their holiday clothes, and set out with their father and mother to the fair.

It was surprising how far silver pennies went in those days; but before evening twelve of the thirteen had spent their money. All had provided themselves with bargains except Merrymind.

The cause of the silver penny remaining in his pocket was that he had set his heart upon a fiddle; and fiddles enough there were at the fair, but there was not one that cost so little as a silver penny.

There was a stall of fiddles kept by a young merchant from a far country, who had many customers, his goods being fine and new; but near by sat a little grey-haired man, at whom everybody had laughed that day, because he had nothing for sale but one old dingy fiddle, and all its strings were broken.

"Buy a fiddle, my young lad?" he said, as Merrymind came forward. "You shall have it cheap; I ask but a silver penny for it; and if the strings were mended, its like would not be found in the whole of the north country."

Merrymind thought this a great bargain. He was a handy boy, and could mend the strings while watching his father's sheep. So down went the silver penny on the little man's stall, and up went the fiddle under Merrymind's arm.

"Now, my little lad," said the little man, "if you help me to pack my stall, I will tell you a wonderful piece of news about that fiddle. It is certain the strings can never be mended, nor made new, except by threads from the night-spinners, which, if you get, will be a good pennyworth."

Merrymind made haste to join the rest of the family, who were soon on their way home. When they got there everyone showed his bargain, and Merrymind showed his fiddle; but his brothers and sisters laughed at him for buying such a thing when he had never learned to play. His sisters asked him what music he could bring out of broken strings; and his father said:

"You have shown little prudence in using your first penny, and I fear you will never have many to spend."

Merrymind tried to repair the strings; but, true to the little man's parting words, no string would hold on that fiddle.

In the meantime, Merrymind lost credit at home, and, as nobody cared for him except his mother, he resolved to go to seek his fortune.

So Merrymind set out one summer morning, with the broken-stringed fiddle under his arm.

There were no highways then in the north country, so Merrymind went over the fair ground and over the hill. On the other side it was steep and rocky, and, after a hard scramble down, he came to a narrow glen all overgrown with wild furze and brambles.

Merrymind was weary with his long journey, and stood thinking of what

path to choose, when, by the way of the valley, there came an old man as tall and large as any three men of the north country. On his back he carried a heavy burden of dust, heaped high in a great basket.



"BUY A FIDDLE, MY YOUNG LAD?" SAID A LITTLE GREY-HAIRED MAN TO MERRYMIND

"Listen to me, you lazy fellow!" he said, coming near to Merrymind. "If you take the way through the wood, I know not what will happen to you, but if you choose this path, you must help me with my basket."

"Well, father," said Merrymind, "you seem tired, and I am younger than you, so, if you please, I will help you to carry the basket along the road." Hardly had he spoken when the huge man caught hold of him, firmly bound one side of the basket to his shoulders, and never ceased scolding and calling him names as they marched over the stony ground together. It was a rough way, and a heavy burden, but Merrymind began to sing an old rhyme which his mother had taught him. By this time they had entered the valley, and

the night had fallen very dark and cold. The old man ceased scolding, and Merrymind saw that they were close to a



"LISTEN TO ME, YOU LAZY FELLOW!" HE SAID

deserted cottage, for its door stood open. Here the old man paused, and loosened the rope from his own and Merrymind's shoulders.

"For seven times seven years," he said, "have I carried this basket, and no one ever sang while helping me before. Where will you sleep—by my kitchen fire or in that cold cottage?" Merrymind thought he had had quite enough of the old man's society, and therefore answered without hesitation:

"The cottage, good father, if you please."

Merrymind stepped into the deserted cottage. The hearth looked as if there had not been a fire there for years. Not a single article of furniture was to be seen. But Merrymind was very tired, and, lying down in a corner, with his fiddle close by, he fell fast asleep.

The floor was hard, and his clothes were thin; but all through his sleep there came a sweet sound of singing voices and spinning-wheels, and Merrymind thought he must have been dreaming when he opened his eyes next morning. He ate half a barley cake, drank from a stream close by, and went out to see the valley.

It was full of people, and they were all busy in houses and in fields, in mills and in forges. The men hammered and dug; the women scrubbed and scoured; the very children were hard at work; but Merrymind could hear neither talk nor laughter among them. Every face looked careworn and sad, and every word was something about work or gain.

Merrymind thought this strange, for everybody appeared rich. The women scrubbed in silk, the men dug in scarlet clothes. Crimson curtains, marble floors, and shelves of silver cups were to be seen in every house; but their owners took no pleasure in them, and everyone labored, as it were, for life.

In the middle of the valley there stood a stately castle. The gates were open, and Merrymind ventured in. In the highest tower of that busy castle, at a window from which she could see the whole valley, there sat a noble lady. Her dress was rich, but of a dingy drab color. Her hair was iron-grey; her look was sad and gloomy. Round her sat twelve maidens, spinning on old distaffs; and the lady spun as hard as they; but all the yarn they made was jet black.

No one in or out of the castle would speak to Merrymind, or answer his questions. Everyone was too busy. All day Merrymind wandered about with his broken-stringed fiddle, and all day he



THEY WERE ALL BUSY IN HOUSES & IN FIELDS

saw the old man marching round and round the valley with his heavy burden of dust.

In the evening, near the deserted cottage, Merrymind met the old man.

"Good father," he said, "tell me what games the people of this valley have."

"Games!" cried the old man, in great anger. "There are no games in Dame Dreary's land, I can assure you." That night the boy did not sleep so well, but he was sure there had been singing and spinning near him all night.

Next day a heavy mist shut out sun and sky; the same hard work went forward wherever he turned his eyes; and the great old man with the dust-pannier strode on his accustomed round. Merrymind wandered away till he came to the farthest end of the valley.



"HONORABLE LADIES, I PRAY YOU GIVE A POOR BOY A THREAD TO MEND HIS FIDDLE-STRINGS"

There, there was no work, for the land lay bare and lonely, and was bounded by grey crags, as high and steep as any castle wall. There was no passage or outlet, except through a great iron gate secured with a heavy padlock. Close by it stood a white tent, and in the doorway a tall soldier, with one arm, stood smoking a long pipe. He was the first idle man Merrymind had seen in the valley, and his face looked to him like that of a friend; so the boy said:

"Master soldier, will you please tell me what country is this, and why do the people always work so hard?"

"Hold my pipe, and I will tell you," said the soldier, "for nobody else will take the time. The valley belongs to the lady of yonder castle, whom, for seven times seven years, men have called Dame Dreary. She had another name in her youth—they called her Lady Littlecare; and then the valley was the fairest spot in all the north country. Strongarm, the last of the giants, kept the pine forest, and hewed logs out of it, when he was not sleeping in the sun.

"Two fair maidens, clothed in white, with silver wheels on their shoulders, came by night, and spun golden threads by the hearth of every cottage. The

people had merry times. All that was changed, nobody knows how, for the old folks who remembered it are dead. Some say it was because of a magic ring which fell from the lady's finger; some because of a spring in the castle court which went dry. However it was, the lady turned Dame Dreary. The fairies departed; the giant Strongarm grew old, and took up a burden of dust; and the night-spinners were seen no more in any man's dwelling. They say it will be so till Dame Dreary lays down her distaff and dances; but all the fiddlers of the north country have tried their merriest tunes to no purpose."

"If my fiddle were mended, it would be a good thing," said Merrymind. And he then went home to sleep in the deserted cottage.

It was late when he came near it, and the moonlight night looked lovely beside the misty day. Merrymind thought it was a good time for trying to get out of the valley. There was no one about, and no appearance of the giant; but as Merrymind drew near to where the two paths met, there he was fast asleep. He tried to steal past; but Strongarm started up, and pursued him with stones half-way back to the old cottage.



THE DAME DANCED WITH ALL HER MIGHT

Merrymind was glad to run the whole way for fear of him. The door was still open, and the moon was shining in; but by the fireless hearth there sat two fair maidens, all in white, spinning on silver wheels, and singing together like the larks on a May morning. Merrymind could have listened all night; but he suddenly thought that these must be the night-spinners, whose threads would mend his fiddle; so he said:

"Honorable ladies, I pray you give a poor boy a thread to mend his fiddle-strings."

"For seven times seven years," said the fair maidens, "have we spun by night in this deserted cottage, and no mortal has seen or spoken to us. Go and gather sticks through all the valley to make a fire for us on this cold hearth, and each of us will give you a thread for your pains."

Merrymind took his broken fiddle with him, and went through all the valley gathering sticks by the moonlight; but so careful were the people of Dame Dreary's land that scarcely a stick could be found, and the moon was gone before he was able to come back with a small bundle. The cottage door was still open; the fair maidens and their silver wheels were gone; but, to his great surprise, on the floor where they had sat lay two long threads of pure gold. Merrymind first heaped up his wood on the hearth, to be ready against their coming at night, and next took up the golden threads to mend his fiddle. Then he learned the truth of the little man's saying at the fair, for no sooner were the strings fastened with those golden threads than they became firm. The old dingy fiddle, too, began to shine and glisten, and at length it was golden also. This sight made Merrymind so joyful that, although he had never studied music, the boy tried to play. Scarcely had his bow touched the strings when they began to play of themselves the same pleasant tune which the night-spinners sang together.

"Some of the workers will stop for the sake of this tune," said Merrymind; and he went out along the valley with his fiddle.

The music filled the air; the busy people heard it; and never was such a day seen in Dame Dreary's land. The men paused in their delving; the women stopped their scrubbing; the little children dropped their work, and

everyone stood still in their places while Merrymind and his fiddle passed on. When he came to the castle, Dame Dreary's distaff stood still in her hand. Merrymind played through the halls and up the tower stairs. As he came near, the dame cast down her distaff, and danced with all her might. All her maidens danced too; and as they danced she grew young again. They brought her the dress of white and cherry color she used to wear in her youth, and she was no longer Dame Dreary, but the Lady Littlecare, with golden hair and laughing eyes.

Then a sound of merry-making came up from the whole valley. Strongarm tossed the basket of dust from his shoulder, and lay down to sleep in the sun. That night the fairies danced on the hill-tops; and the night-spinners, with their silver wheels, were seen by every hearth. Everybody praised Merrymind and his fiddle; and when news of his wonderful playing came to the king's ears, he promoted Merrymind to be his first fiddler, which, under that wise monarch, was the highest post in his kingdom.

As soon as Merrymind's family and neighbors heard of the high position his fiddle had gained for him, they thought music must be a good thing, and man, woman, and child took to fiddling. It is said that none of them ever learned to play a single tune except Merrymind's mother, on whom her son bestowed many nice presents.

THE RABBI IN THE DESERT

A FAMOUS Jewish rabbi named Akiba was driven by persecution from his native land, and compelled to wander over the dreary desert.

His whole possessions consisted of a lamp, which he used to light at night in order to study a book containing the sacred law; a cock, which used to wake him in good time in the morning by its crowing; and an ass, on which he rode.

One evening the rabbi felt almost too exhausted to go farther, and wondered where he could find shelter for the night. He saw ahead of him a village, and determined to press on and ask for a lodging.

Astonishing to relate, however, not one of the churlish inhabitants of that village would give the weary traveler shelter, and, disappointed and fatigued, he was compelled to make his way into a wood.

"It is hard," said the rabbi, "to think that no one will allow me to take shelter for the night; but, after all, God is just, and whatever He does must be best."

Seating himself under a tree, he lit his lamp, and began to read out of the book of the law. He had only read a few lines when a gust of wind blew out the light.

"What!" exclaimed the rabbi. "Am I not permitted even to read? But God is just, and whatever He does must be best."

He stretched himself out on the cold, bare earth, trying to get a few hours' sleep. But just as he was dozing off there was a noise, and he woke to find a fierce wolf hurrying past with a bird in its mouth. It was his favorite bird, the cock that woke him every morning.

"Alas!" cried he, "what new misfortune is this that has overtaken me? The cock, who has been my vigilant companion for so long, is gone. Who now will awaken me to the study of the law? But, after all, God is just, and whatever He does must be best."

Scarcely had he lain down again when a lion sprang upon his ass, and carried it off into the darkness.

"What am I to do now?" cried the distressed rabbi. "My light, my bird, and my poor ass are all gone, and I must wander alone. But, praise be to God, He is just, and what He does must be best."

After a sleepless night, the rabbi went to the village to see if he could obtain a horse to carry him on his way. But what was his surprise and horror to find that all the houses had been plundered and their inhabitants killed during the night by a band of robbers.

"Forgive me, Lord, for complaining," said he, as he turned his face upward. "Had not the people driven me from their village I should certainly have shared their fate; had not the wind blown out my light the robbers would have been attracted to the spot, and have killed me also; and hadst Thou not deprived me of my two companions their noise would also have brought the robbers. Praise be to Thee for ever; Thou art just, and what Thou doest is best."

A BALLAD OF THE BORDERLAND

THE beautiful country, on both sides of the Cheviots, known as the Borderland is a region of green hills and valleys, where the waters of many streams make music as they flow. This Borderland has always been famous for its legends, and many ballads have been collected in which these legends are told. James Hogg gave a new dress of poetry to one of these old legends in his famous ballad of "Kilmeny." The story was an old one long before the poet heard it, and he told it in the beautiful musical way of an old ballad. Kilmeny is a lovely girl lost in the woods, and for seven years her mother mourns her. Then one day she comes home. She is strangely quiet, though, if anything, more beautiful than ever. She had been stolen away by the fairies, as she was so pure and lovely. Then her heart had yearned for her old home, and the fairies let her go back. But after a month and a day Kilmeny wanders again to the greenwood, and, lying down there, the fairies bear her away where everything is as pure and beautiful as Kilmeny herself, and she returns no more.

KILMENY: A FAIRY LEGEND

CONTINUED FROM 4341

BONNY Kilmeny gaed up the glen;
But it wasna to meet Duneira's men,
Nor the rosy monk of the isle to see,
For Kilmeny was pure as pure could be
It was only to hear the Yorlin sing,
And pu' the cress-flower round the spring;
The scarlet hyppe, and the hindberry,
And the nut that hung frae the hazel-tree;
For Kilmeny was pure as pure could be.
But lang may her minny look o'er the wa',
And lang may she seek i' the greenwood shaw;
Lang the laird of Duneira blame,
And lang, lang greet or Kilmeny come hame!

When many lang day had come and fled,
When grief grew calm, and hope was dead,
When Mass for Kilmeny's soul had been sung,
When the bedes-man had prayed, and the deadbell rung:
Late, late in the gloamin' when all was still,
When the fringe was red on the westlin hill,
The wood was sere, the moon i' the wane,
The reek o' the cot hung o'er the plain,
Like a little wee cloud in the world its lane;
When the ingle lowed with an eiry leme,
Late, late in the gloamin' Kilmeny came hame!

"Kilmeny, Kilmeny, where have you been?
Lang hae we sought baith holt and dean;
By linn, by ford, and greenwood tree,
Yet you are halesome and fair to see.
Where gat you that joup o' the lily sheen?
That bonny snood o' the birk sae green?
And these roses the fairest that ever was seen?
Kilmeny, Kilmeny, where have you been?"

Kilmeny looked up with a lovely grace,
But nae smile was seen on Kilmeny's face;
As still was her look, and as still was her ee,
As the stillness that lay on the emerant lea,
Or the mist that sleeps on a waveless sea.
For Kilmeny had been she ken'd not where,
And Kilmeny had seen what she could not declare;
Kilmeny had been where the cock never crew,
Where the rain never fell and the wind never blew.
But it seemed as the harp of the sky had rung,
And the airs of heaven played round her tongue,
When she spake of the lovely forms she had seen,
And a land where sin had never been:
A land of love, and a land of light,
Withouten sun, or moon, or night;
Where the river swa'd a living stream,
And the light a pure and cloudless beam.
The land of vision it would seem,
A still, an everlasting dream.

In yon greenwood there is a waik,
And in that waik there is a wene,
And in that wene there is a maike,
That neither has flesh, nor blood, nor bane;
And down in yon greenwood he walks his lane.

In that green wene Kilmeny lay,
Her bosom happ'd wi' flowerets gay;
But the air was soft and the silence deep,
And bonny Kilmeny fell sound asleep.
She kenned nae mair, nor open'd her ee,
Till waked by the hymns of a far countrye.

She woke on a couch of the silk sae slim,
All striped wi' the bars of the rainbow's rim;
And lovely beings round were rife,
Who erst had travelled mortal life;
And aye they smiled and 'gan to speer,
"What spirit has brought this mortal here?"

"Lang have I ranged the world wide,"
A meek and reverend fere replied;
"Baith night and day I have watched the fair
Eident a thousand years and mair.
Yes, I have watched o'er ilk degree,
Wherever blooms femenitye;
And sinless virgin, free of stain
In mind and body, fand I nane.
Never, since the banquet of time,

Found I a virgin in her prime,
Till late this bonnie maiden I saw,
As spotless as the morning snaw:
Full twenty years she has lived as free
As the spirits that sojourn in this countrye:
I have brought her away frae the snares of men,
That sin or death she never may ken."

They clasped her waist and her hands sae fair,
They kissed her cheek, and they kemed her hair;
And round came many a blooming fere,
Saying: "Bonny Kilmeny, ye're welcome here!
Women are freed of the littand scorn:
O, blessed be the day Kilmeny was born!
Now shall the land of the spirits see,
Now shall it ken what a woman may be!
Many lang year in sorrow and pain,
Many lang year through the world we've gane,
Commissioned to watch fair womankind,
For it's they who nurse the immortal mind.
We have watched their steps as the dawning shone,
And deep in the greenwood walks alone;
By lily bower and silken bed,
The viewless tears have o'er them shed;
Have soothed their ardent minds to sleep,
Or left the couch of love to weep.
We have seen! we have seen! but the time maun come,
And the angels will weep at the day of doom!

"O, would the fairest of mortal kind
Aye keep these holy truths in mind,
That kindred spirits their motions see,
Who watch their ways with anxious ee,
And grieve for the guilt of humanitye.
O, sweet to Heaven the maiden's prayer,
And the sigh that heaves a bosom sae fair.
And dear to Heaven the words of truth,
And the praise of virtue frae beauty's mouth!
And dear to the viewless forms of air,
The mind that kythes as the body fair.

"O bonny Kilmeny! free frae stain,
If ever you seek the world again,
That world of sin, of sorrow, and fear,
O, tell of the joys that are waiting here;
And tell of the signs you shall shortly see;
Of the times that are now, and the times that shall be."

They lifted Kilmeny, they led her away,
And she walked in the light of a sunless day:
The sky was a dome of crystal bright,
The fountain of vision, the fountain of light:
The emerant fields were of dazzling glow,
And the flowers of everlasting blow.
Then deep in the stream her body they laid,
That her youth and beauty never might fade;
And they smiled on heaven, when they saw her lie
In the stream of life that wandered by.
And she heard a song, she heard it sung,
She kend not where; but sae sweetly it rung,
It fell on her ear like a dream of the morn:
"O, blest be the day Kilmeny was born!
Now shall the land of the spirits see,
Now shall it ken what a woman may be!
The sun that shines on the world sae bright,
A borrowed gleid frae the fountain of light;
And the moon that sleeks the sky sae dun,
Like a gouden bow, or a beamless sun,
Shall wear away and be seen nae mair,
And the angels shall miss them travelling the air,
But lang, lang after baith night and day,
When the sun and the world have fled away;
When the sinner has gane to his waesome doom,
Kilmeny shall smile in eternal bloom!"

They bore her away, she wist not how,
For she felt not arm nor rest below;
But so swift they wained her through the light,
'Twas like the motion of sound or sight;
They seemed to split the gales of air,
And yet nor gale nor breeze was there.
Unnumbered groves below them grew;
They came, they past, and backward flew,
Like floods of blossoms gliding on,
A moment seen, in a moment gone.
O, never vales to mortal view
Appeared like those o'er which they flew!
That land to human spirits given,
The lowermost vales of the storied heaven;
From thence they can view the world below,
And heaven's blue gates with sapphires glow,
More glory yet unmeet to know.

They bore her far to a mountain green,
To see what mortal never had seen;
And they seated her high on a purple sward,
And bade her heed what she saw and heard;
And note the changes the spirits wrought,
For now she lived in the land of thought.
She looked, and she saw nor sun nor skies,
But a crystal dome of a thousand dyes;
She looked, and she saw nae land aright,
But an endless whirl of glory and light;
And radiant beings went and came
Far swifter than wind, or the linkèd flame.
She hid her een frae the dazzling view;
She looked again, and the scene was new.

She saw a sun on a summer sky,
And clouds of amber sailing by;
A lovely land beneath her lay,
And that land had lakes and mountains gray;
And that land had valleys and hoary piles,
And marlèd seas and a thousand isles.
Its fields were speckled, its forests green,
And its lakes were all of the dazzling sheen,
Like magic mirrors, where slumbering lay
The sun and the sky, and the cloudlet gray;
Which heaved and trembled, and gently swung,
On every shore they seemed to be hung:
For there they were seen on their downward plain
A thousand times, and a thousand again;
In winding lake, and placid firth,
Like peaceful heavens in the bosom of earth.

Kilmeny sighed and seemed to grieve,
For she found her heart to that land did cleave;
She saw the corn wave on the vale,
She saw the deer run down the dale;
She saw the plaid and the broad claymore,
And the brows that the badge of freedom bore;
And she thought she had seen the land before.

She saw a lady sit on a throne,
The fairest that ever the sun shone on:
A lion licked her hand of milk,
And she held him in a leish of silk;
And a leifu' maiden stood at her knee,
With a silver wand and melting ee;
Her sovereign shield till love stole in,
And poisoned all the fount within.

Then a gruff untoward bedes-man came,
And hundit the lion on his dame;
And the guardian maid wi' the dauntless ee,
She dropped a tear, and left her knee;
And she saw till the queen frae the lion fled,
Till the bonniest flower of the world lay dead;
A coffin was set on a distant plain,
And she saw the red blood fall like rain;
Then bonny Kilmeny's heart grew sair,
And she turned away, and could look nae mair.

Then the gruff grim carle girnèd amain,
And they trampled him down, but he rose again;
And he baited the lion to deeds of weir,
Till he lapped the blood to the kingdom dear;
And weening his head was danger-preef,
When crowned with the rose and clover-leaf,
He gowled at the carle, and chased him away,
To feed wi' the deer on the mountain gray.
He gowled at the carle, and he gecked at Heaven;
But his mark was set, and his arles given.
Kilmeny a while her een withdrew;
She looked again, and the scene was new.

She saw below her fair unfurled
One half of all the glowing world,
Where oceans rolled, and rivers ran,
To bound the aims of sinful man.
She saw a people, fierce and fell,
Burst frae their bounds like fiends of hell;
There lilies grew, and the eagle flew,
And she herked on her ravening crew,
Till the cities and towers were wrapped in a blaze,
And the thunder it roared o'er the lands and the seas.
The widows they wailed, and the red blood ran,
And she threatened an end to the race of man:
She never lened, nor stood in awe,
Till caught by the lion's deadly paw.
Oh! then the eagle swinked for life,
And brainzelled up a mortal strife;
But flew she north, or flew she south,
She met wi' the gowl of the lion's mouth.

With a mooted wing and waefu' maen,
The eagle sought her eiry again;
But lang may she cower in her bloody nest,
And lang, lang sleek her wounded breast,
Before she sey another flight,
To play wi' the norland lion's might.

But to sing the sights Kilmeny saw,
So far surpassing Nature's law,
The singer's voice wad sink away,
And the string of his harp wad cease to play.
But she saw till the sorrows of man were by,
And all was love and harmony;
Till the stars of heaven fell calmly away,
Like the flakes of snaw on a winter's day.
Then Kilmeny begged again to see
The friends she had left in her own countrye,
To tell of the place where she had been,
And the glories that lay in the land unseen;
To warn the living maidens fair,
The loved of Heaven, the spirits' care,
That all whose minds unmeled remain
Shall bloom in beauty when time is gane.

With distant music, soft and deep,
They lulled Kilmeny sound asleep;
And when she awakened, she lay her lane,
All happed with flowers in the greenwood wene,
When seven lang years had come and fled;
When grief was calm, and hope was dead;
When scarce was remembered Kilmeny's name,
Late, late in a gloaming Kilmeny came hame.
And O, her beauty was fair to see,
But still and steadfast was her ee!
Such beauty bard may never declare,
For there was no pride nor passion there;
And the soft desire of maiden's een
In that mild face could never be seen.
Her seymar was the lily-flower,
And her cheek the moss-rose in the shower;
And her voice like the distant melodye,
That floats along the twilight sea.
But she loved to raike the lanely glen,
And keep afar frae the haunts of men;
Her holy hymns unheard to sing,
To suck the flowers and drink the spring.
But wherever her peaceful form appeared,
The wild beasts of the hills were cheered;
The wolf played blythely round the field,
The lordly byson lowed and kneeled;
The dun deer wooed with manner bland,
And cowered aneath her lily hand.
And when at eve the woodlands rung,
When hymns of other worlds she sung
In ecstasy of sweet devotion,
O, then the glen was all in motion!
The wild beasts of the forest came,
Broke from their boughts and faulds the tame,
And goved around, charmed and amazed;
Even the dull cattle crooned and gazed,
And murmured and looked with anxious pain,
For something the mystery to explain.
The buzzard came with the throstle-cock;
The corby left her houf in the rock;
The blackbird alang wi' the eagle flew;
The hind came tripping o'er the dew;
The wolf and the kid their raike began,
And the tod, and the lamb, and the leveret ran;
The hawk and the hern attour them hung,
And the merl and the mavis forhooyed their young;
And all in a peaceful ring were hurled—
It was like an eve in a sinless world!

When a month and day had come and gane,
Kilmeny sought the greenwood wene;
There laid her down on the leaves sae green;
And Kilmeny on earth was never mair seen.
But O, the words that fell from her mouth
Were words of wonder and words of truth!
But all the land were in fear and dread,
For they kendna whether she was living or dead.
It wasna her hame, and she couldna remain;
She left this world of sorrow and pain,
And returned to the land of thought again.

OPPORTUNITY

The writer of this short poem was Edward Rowland Sill, an American poet, who died early in life, but who, had he been spared, might have been one of the greatest poets the American nation has produced. His theme here is an old one, the contrast between the man who sighs for the opportunity to do great things and the man who does them by seizing whatever means exist, thus making the opportunity. It is an old theme, but the poet, by the sheer pith and compression of his verse, enforces the moral upon our minds as if it were the first time it had been conveyed to us.

THIS I beheld, or dreamed it in a dream—
There spread a cloud of dust along a plain;
And underneath the cloud, or in it, raged
A furious battle, and men yelled, and swords
Shocked upon swords and shields. A prince's banner
Wavered, then staggered backward, hemmed by foes.

A craven hung along the battle's edge,
And thought, "Had I a sword of keener steel—
That blue blade that the king's son bears—but this
Blunt thing!"—he snapped and flung it from his hand,
And lowering crept away, and left the field.

Then came the king's son, wounded, sore, bestead,
And weaponless, and saw the broken sword,
Hilt buried in the dry and trodden sand,
And ran and snatched it, and, with battle shout
Lifted afresh, he hewed the enemy down,
And saved a great cause that heroic day.

THE DISCOVERER

Edmund Clarence Stedman was a very distinguished American poet, who died at the beginning of 1908, in his seventy-fifth year. His writings are better known in America than they are in England, but the charm of his verse ought to make it widely read wherever the English tongue is spoken. In the following poem we have this fine writer in a tender mood, for the discoverer of whom he sings is just any little child that dies and all too soon sets out on the great mysterious journey to the unknown land. "The Discoverer" is really, in a sense, another view of "Peter Pan."

I HAVE a little kinsman
Whose earthly summers are but three,
And yet a voyager is he
Greater than Drake or Frobisher,
Than all their peers together!
He is a brave discoverer,
And, far beyond the tether
Of them who seek the frozen Pole,
Has sailed where the noiseless surges roll.
Ay, he has travelled whither
A winged pilot steered his bark
Through the portals of the dark,
Past hoary Mimir's well and tree,
Across the unknown sea.

Suddenly, in his fair young hour,
Came one who bore a flower,
And laid it in his dimpled hand
With this command:
"Henceforth thou art a rover!
Thou must make a voyage far,
Sail beneath the evening star,
And will a wondrous land discover."
With his sweet smile innocent
Our little kinsman went.

Since that time no word
From the absent has been heard.
Who can tell
How he fares, or answer well
What the little one has found
Since he left us, outward bound?
Would that he might return!
Then should we learn
From the pricking of his chart
How the skyey roadways part.
Hush! does not the baby this way bring,
To lay beside this severed curl,
Some starry offering
Of chrysolite or pearl?

Ah, no! not so!
We may follow on his track,
But he comes not back.
And yet I dare aver
He is a brave discoverer
Of climes his elders do not know.
He has more learning than appears
On the scroll of twice three thousand years,
More than in the groves is taught,
Or from furthest Indies brought;
He knows, perchance, how spirits fare,
What shapes the angels wear,
What is their guise and speech
In those lands beyond our reach,
And his eyes behold
Things that shall never, never be to mortal hearers told.

THE FLIGHT OF THE ARROW*

Richard Henry Stoddard was a notable American poet, born in 1825, who died in 1903. His poems are not so well known in other countries as those of other Americans, such as Longfellow, Whittier, and Lowell; but, for all that, he was a writer of distinction, and we are glad to include these lines of his, in which, following the example of Longfellow in his poem beginning "I shot an Arrow in the Air," he makes use of the arrow's flight to illustrate a great lesson in life.

THE life of man
Is an arrow's flight
Out of darkness
Into light,
And out of light
Into darkness again;
Perhaps to pleasure,
Perhaps to pain!

There must be Something,
Above, or below;
Somewhere unseen
A mighty Bow,
A Hand that tires not,
A sleepless Eye
That sees the arrows
Fly, and fly;
One who knows
Why we live—and die.

THE LORD'S PRAYER IN VERSE

The author of this versified Lord's Prayer is not known, and he was probably not much of a poet, nor can we say that the beautiful words of the Scripture are improved by being turned into rhyme. We give the lines here, as young readers find verse easier to memorize than prose.

FATHER in heaven, hallowed be Thy name,
Thy kingdom come; Thy will be done the same
In earth and heaven. Give us daily bread;
Forgive our sins as others we forgive,
Into temptation let us not be led,
Deliver us from evil while we live.
For kingdom, power, and glory must remain
For ever and for ever Thine: Amen.

* From poems of Richard Henry Stoddard, copyright, 1880, by Charles Scribner's Sons.

JESU! LOVER OF MY SOUL

There is no finer hymn in the English language than this beautiful composition by Charles Wesley, the brother of John Wesley, who founded the Methodist Church. Charles Wesley was born in 1707 and died in 1788, his life being full of religious activity and earnest spreading of the Gospel. In all he composed some six thousand hymns, only a few of which are still in use, but "Jesu! Lover of My Soul" is certainly unsurpassed in all the range of sacred song. It is said that the author was sitting one day at his desk when a bird, pursued by a hawk, flew in at the open window. The hawk, afraid to follow, flew away, and Wesley, struck by the incident, was at once inspired to write this song, applying what he had just witnessed to our spiritual life.

JESU! Lover of my soul,
Let me to Thy bosom fly;
While the nearer waters roll,
While the tempest still is high.
Hide me, O my Saviour, hide,
Till the storm of life is past;
Safe into the haven guide,
O receive my soul at last!

Other refuge have I none;
Hangs my helpless soul on Thee;
Leave, ah! leave me not alone,
Still support and comfort me!
All my trust on Thee is stayed,
All my help from Thee I bring;
Cover my defenceless head
With the shadow of Thy wing.

Wilt Thou not regard my call?
Wilt Thou not accept my prayer?
Lo! I sink, I faint, I fall,
Lo! on Thee I cast my care.
Reach me out Thy gracious hand!
While I of Thy strength receive;
Hoping against hope I stand,
Dying, and behold I live!

Thou, O Christ, art all I want,
More than all in Thee I find;
Raise the fallen, cheer the faint,
Heal the sick, and lead the blind.
Just and holy is Thy name,
I am all unrighteousness;
False and full of sin I am,
Thou art full of truth and grace.

Plenteous grace with Thee is found,
Grace to cover all my sin;
Let the healing streams abound,
Make and keep me pure within.
Thou of life the Fountain art,
Freely let me take of Thee;
Spring Thou up within my heart,
Rise, to all eternity!

A STANZA ON FREEDOM

James Russell Lowell, a well-known American poet, was always a sturdy singer in the cause of freedom. In these lines he admirably expresses the ideal of freedom, for it is better "to be in the right with two or three" and suffer in consequence than to be comfortably in the wrong with the many and thus escape "the troubles that afflict the just."

THEY are slaves who fear to speak
For the fallen and the weak;
They are slaves who will not choose
Hatred, scoffing, and abuse,

Rather than in silence shrink
From the truth they needs must think;
They are slaves who dare not be
In the right with two or three.

THE GOOD, GREAT MAN

Here is a short poem which may be described as a gem in every sense. The noble and inspiring thought which it contains is expressed in language of simple beauty and dignity. The lesson it teaches us is one easy to understand if difficult to put in practice! For the more we know of life the more sure shall we become that the poet is right in thinking "goodness and greatness are not means, but ends." There is a familiar saying: "virtue is its own reward." This means that to do the right thing, not for the sake of recompense or recognition, but merely for the sake of doing the right thing, is the greatest reward that virtue can obtain. That is the lesson to be learned from this fine little poem by Coleridge, the author of "The Ancient Mariner."

HOW seldom, friend, a good, great man inherits
Honour and wealth, with all his worth and pains!
It seems a story from the world of spirits
When any man obtains that which he merits,
Or any merits that which he obtains.

For shame, my friend, renounce this idle strain.
What wouldst thou have a good, great man obtain?
Wealth, title, dignity, a golden chain,
Or heap of corses which his sword hath slain?
Goodness and greatness are not means, but ends.

Hath he not always treasures, always friends,
The great, good man? Three treasures: love, and light,
And calm thoughts, equable as infant's breath;
And three fast friends, more sure than day or night:
Himself, his Maker, and the angel Death.

LORD, IT BELONGS NOT TO MY CARE

Richard Baxter was an English Presbyterian minister who had a long, eventful life between the years 1615 and 1691, being sometimes eminent in the religious affairs of his country, but in the later years of his life often subject to persecution. He wrote much both in prose and verse. The following is a good example of his religious poetry.

LORD, it belongs not to my care,
Whether I die or live;
To love and serve Thee is my share,
And this Thy grace must give.

If life be long I will be glad,
That I may long obey;
If short—yet why should I be sad
To soar to endless day?

Christ leads me through no darker rooms
Than He went through before;
He that into God's kingdom comes,
Must enter by His door.

Come, Lord, when grace hath made me meet
Thy blessed face to see;
For if Thy work on earth be sweet,
What will Thy glory be?

Then I shall end my sad complaints
And weary sinful days;
And join with the triumphant saints
To sing Jehovah's praise.

My knowledge of that life is small,
The eye of faith is dim;
But 'tis enough that Christ knows all,
And I shall be with Him.

LITTLE VERSES FOR VERY LITTLE PEOPLE

YOU are going out to tea to-day,
So mind how you behave;
Let all accounts I have of you
Be pleasant ones, I crave.

Don't spill your tea, or gnaw your bread,
And don't tease one another;
And Tommy mustn't talk too much,
Or quarrel with his brother.

Say "If you please," and "Thank you, Nurse."
Come home at eight o'clock;
And, Fanny, pray be careful that
You do not tear your frock.

Now, mind your manners, children five,
Attend to what I say;
And then, perhaps, I'll let you go
Again another day.

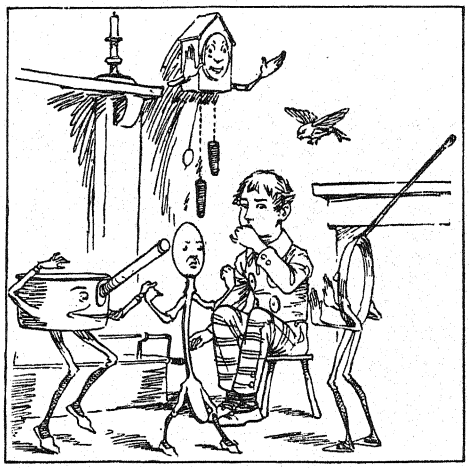
A LITTLE BOY THAT CRIED

ONCE a little boy, Jack, was ever so good,
Till he took a strange notion to cry all he could.
So he cried all the day, and he cried all the night,
He cried in the morning and in the twilight;
He cried till his voice was as hoarse as a crow,
And his mouth grew as large as a capital O.
It grew at the bottom, and grew at the top;
It grew till they thought it never would stop.
Each day his mouth grew taller and taller,
And his dear little self grew smaller and smaller.
At last that same mouth grew so big that, alack!
It was only a mouth with a border of Jack.



DIDDLE, diddle dumpling, my son John,
He went to bed with his stocking on;
One shoe off, and one shoe on,
Diddle, diddle dumpling, my son John.

ON Christmas Eve I turned the spit,
I burnt my fingers, I feel it yet;
The cock sparrow flew over the table,
The pot began to play with the ladle;
The ladle stood up like an angry man,
And vowed he'd fight the frying-pan;



The frying-pan behind the door
Said he never saw the like before;
And the kitchen clock I was going to wind
Said he never saw the like behind.

GREAT A, little A,
This is pancake day;
Toss the ball high,
Throw the ball low,
Those that come after
May sing heigh-ho!

JACK JINGLE went 'prentice
To make a horse-shoe,
He wasted the iron
Till it would not do.
His master came in.
And began for to rail;
Says Jack: "The shoe's spoiled,
But 'twill still make a nail."

He tried at the nail,
But, chancing to miss,
Says: "If it won't make a nail,
It shall yet make a hiss."
Then into the water
Threw the hot iron, smack!
"Hiss!" quoth the iron;
"I thought so," says Jack.

NURSERY RHYMES OF CHILDREN OF FRANCE

JE suis un petit poupon
De belle figure,
Qui aime bien les bonbons
Et les confitures.
Si vous voulez m'en donner
Je saurai bien les manger—
La bonne aventure! Oh, gai!
La bonne aventure!

Lorsque les petits garçons
Sont gentils et sages,
On leur donne des bonbons,
De jolies images.
Mais quand ils se font gronder,
C'est le fouet qu'il faut donner—
La triste aventure! Oh, gai!
La triste aventure!

Je serai sage et bien bon,
Pour plaire à ma mère;
Je saurai bien ma leçon,
Pour plaire à mon père.
Je veux bien les contenter,
Et s'ils veulent m'embrasser—
La bonne aventure! Oh, gai!
La bonne aventure.

AH! vous dirai-je, Maman,
Ce qui cause mon tourment!
Papa veut que je raisonne
Comme une grande personne;
Moi je dis que les bonbons
Valent mieux que la raison.

PAN! Qu'est-ce qu'est là?
C'est Polichinelle,
Mam'selle.
Pan! Qu'est-ce qu'est là?
C'est Polichinelle, que voilà!

Toujours joyeux,
Il aime fort la danse,
Il se balance,
D'un petit air gracieux;
Pan! Qu'est-ce qu'est là?
C'est Polichinelle, que voilà!

Il est mal fait
Et craint de vous déplaire
Mais il espère
Vous chanter son couplet;
Pan! Qu'est-ce qu'est là?
C'est Polichinelle, que voilà!

A vous faire rire,
Mes enfants, il aspire
Jeunes et vieux
Ceux qui rient sont heureux;
Pan! Qu'est-ce qu'est là?
C'est Polichinelle, que voilà!

I'M a chubby little thing,
Rather pretty too.
I *often* eat the sweets folks bring,
And jam I *always* do.
Just give me some, and I will show
The way to eat them up I know.
'Tis awful fun. Oh, joy!
'Tis awful fun.

'Tis very nice when little boys
Do just what boys should do;
Folks give them sweets and often toys,
And pretty pictures too.
But when they're naughty, I believe,
A whipping then is what folks give.
'Tis awful sad. Oh, joy!
'Tis awful sad.

I will be very, very good,
To please my dear Mamma,
And learn my lessons, as I should,
To please my dear Papa.
I always want to do what's right
When Mummy cuddles me up tight.
'Tis awful fun. Oh, joy!
'Tis awful fun.

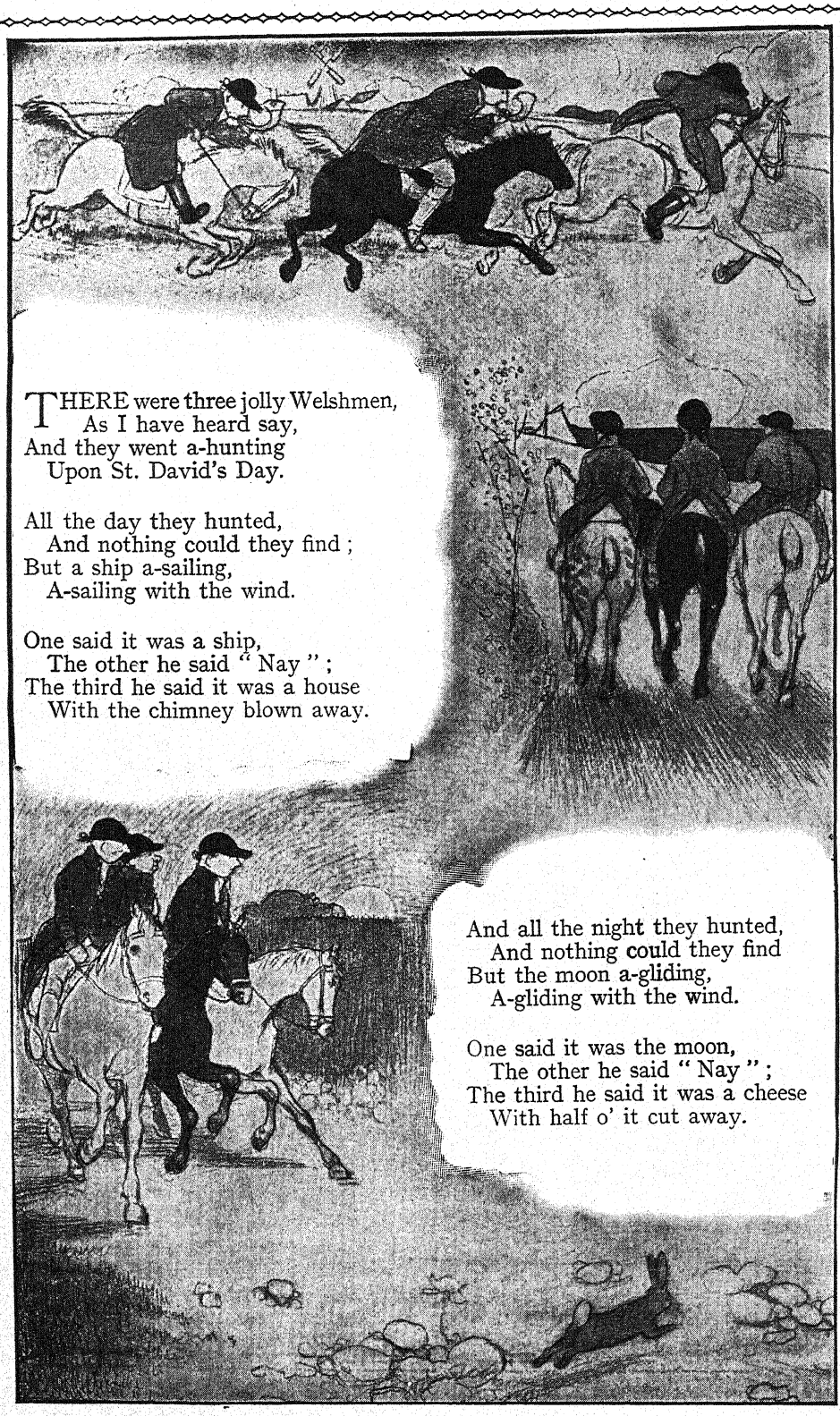
DARLING Mother, shall I say,
Why I feel so sad to-day?
Daddy thinks I ought to know
As much as quite a *big* fellow!
I think games, with sweets for prize,
Better far than being wise.

HALT! Who goes there?
Punchinello,
My fine fellow!
Halt! Who goes there?
Punchinello! Right here!

Always debonnair,
He is fond of a dance,
To retire and advance,
With a courtly air.
Halt! Who goes there?
Punchinello! Right here!

He fears he is wrong;
But yet, in despite,
He'll sing you a song,
If you will invite.
Halt! Who goes there?
Punchinello! Right here!

To cure all who mope,
My friends, is his hope.
Laugh, Age and Youth,
And be happy in truth.
Halt! Who goes there?
Punchinello! Right here!



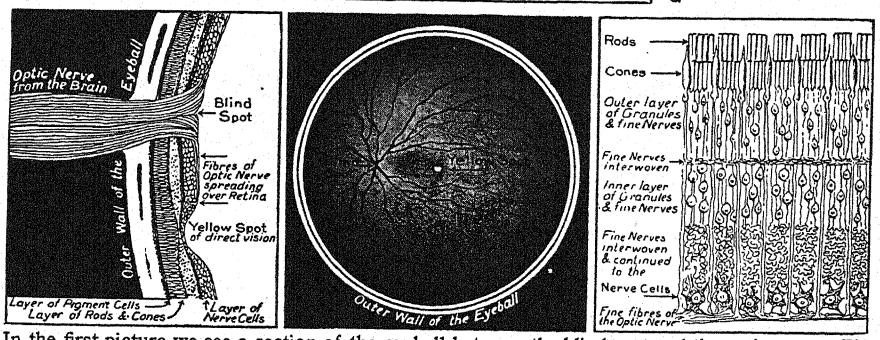
THERE were three jolly Welshmen,
As I have heard say,
And they went a-hunting
Upon St. David's Day.

All the day they hunted,
And nothing could they find ;
But a ship a-sailing,
A-sailing with the wind.

One said it was a ship,
The other he said " Nay " ;
The third he said it was a house
With the chimney blown away.

And all the night they hunted,
And nothing could they find
But the moon a-gliding,
A-gliding with the wind.

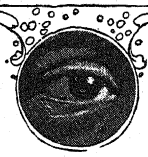
One said it was the moon,
The other he said " Nay " ;
The third he said it was a cheese
With half o' it cut away.



In the first picture we see a section of the eyeball between the blind spot and the optic nerve. The middle picture shows the interior of the eyeball, with the nerve-fibres radiating from the blind spot. In the third, a part of the retina is highly magnified, showing the various layers and rods and cones.

THE LIGHT IN OUR EYES

CONTINUED FROM 4334



WE know all about the lens of the eye, and now we must trace the light after it has passed through the lens, and note what next happens to it. As the pictures on page 4329 show, there is still the greater part of the eyeball for the light to pass through, whether the eyeball be long or short. This part of the eye is entirely filled with a sort of jelly, made of a large number of thin sheets. The name for it means that it is like a piece of glass, while the stuff that fills the front part of the eye, between the cornea and the iris, is quite watery.

At the back of this part of the eye, where the glassy material lies, is the retina, the sensitive plate or curtain where we find the all-important nerve-cells. Before we study it, we must just observe what has happened to the light in the course of its passage through four different things—the cornea, the watery fluid behind it, the lens, and the jelly-like material behind the lens.

In the first place, we must note that in health all these materials are practically transparent, although they cannot be quite transparent, and we know that they throw back a certain amount of light, because when we look at anyone's eye we can see a little picture reflected from the surface of it, showing that all the light which reaches it does not go through. More important than this slight loss of light is the fact that, as we sometimes notice, there are dark patches or spots in our field of vision, and we say that we have "spots before our eyes." These spots are of two kinds—those which are always there and in the same place, and those which are just seen for a time and then disappear. Permanent spots before the eyes are due to some fault in the cornea or in the lens.

There has been some little injury done to the cornea, or some cause of disturbance has occurred in the lens; and in the course of recovery there has been made what is called scar-tissue. Nothing can be done to remove these spots, but, fortunately, people usually become used to them and take no notice of them.

The other kind of spots before the eyes come and go. As a rule we notice them only when we are not very well. They are most commonly seen in the morning by people who have gone to bed too late at night, especially if they have eaten or drunk more than is good for them. With time and a little careful living, and especially

a dose of medicine to clear the blood, these spots disappear. The cause of them is extremely interesting. What produces the spots is to be found there in the eye, perhaps little kinks in the folds of the jelly-like material, perhaps a few white blood-cells that are wandering about on some business of their own, and get in the way of the light, just as a person's head may get in the way at a magic-lantern show and cause a shadow.

THE HEALTHY EYE SHOULD NOT NOTICE LITTLE THINGS THAT IRRITATE

The healthy eye does not notice these things; it is sensitive, but it is not too sensitive. When, however, any part of the body, and especially such a thing as the eye or the ear, is not quite well, or when the body, as a whole, is rather out of form, then these sensitive places become too sensitive; they become irritable, and this is known as the irritability of weakness. It is true not only of a weak eye or a weak ear or of a weak body in general, but it is also true of a weak mind, of weak judgment and weak feelings. If it continues, the results are apt to be very harmful indeed.

The eye in health ought to ignore trifles of no importance inside itself, and it ought to be able to stand a fair amount of light without injury. The healthy ear ought to ignore little disturbances going on inside itself due to the circulation of the blood, movement of the bones and muscles in the middle ear, and so on; it ought to hear no sounds from these causes.

But the eye or the ear that has been overstrained, and has become weak, is bothered by seeing spots or by hearing a singing in the ears, and the case may become much worse, because, in the case of the eye, there are very likely horrid dreams in which unpleasant things are seen, or if it is especially the ear that has been overstrained, there are dreams in which horrid things are heard.

WHY PEOPLE SOMETIMES SEE AND HEAR THINGS THAT ARE NOT THERE

Sometimes the thing goes from bad to worse, and people begin seeing and hearing, apart from dreams, things that are not there. Everyone should know a little about this subject, because, like almost all the evils in the world, these are easy to withstand in their beginnings, but very hard to catch up with if they get a good start. We have to remember that, for us human beings, the eye and the ear are the most highly developed, the most important, the most constantly used, and therefore the most delicate of our organs of sense, and we ought always to be attentive when they begin to misbehave themselves. It is not their fault, but ours, as a rule. A little care, common-sense, and rest at this stage will put everything right.

Now, having seen how it is that the light may be interfered with on its way to the retina, we must just observe what these various materials do to the light in the way of bending it. The diagrams on page 4329 show what happens to the light, and we have only to glance at them to see how closely the eye resembles the various kinds of instruments with lenses that human beings make and use for themselves.

If we look at the course of the light in the normal eye, the short-sighted eye, and the long-sighted eye, we shall be ready to understand how spectacles affect the refraction of the light as it passes through the four materials on its way from the outside to the retina.

HOW THE RAYS OF LIGHT ARE BENT INSIDE THE EYE

All we need to do is to remember the simple rule that, when light passes through a lens, the rays are bent towards the thicker part of the lens, wherever that is. This, of course, is equally true whether the lens be inside the eye and made by the body, or whether it be a lens of glass placed directly in front of the eye.

If we look at the pictures on page 4329, we can easily find out for ourselves what kind of lens it is that would be useful for a short-sighted and what for a long-sighted person; also what kind of glasses would be required for a person whose own lenses had been taken away on account of cataract.

The way really to understand this subject—and the same is true of many subjects—is not merely to read about it or to look at pictures. It is always necessary to do something more actively oneself. We should either explain the thing to someone else, by word of mouth, or we should write down for ourselves an account of the facts, and in both cases we ought to make diagrams for ourselves as we go along.

In this way we soon discover what

parts of the thing we really understand, and what parts we do not, and very often, if we try, we can think a thing out for ourselves. To do that once is better than to read the explanation of it many times. Therefore, when this part of the subject has been read, let us take a piece of paper and a pencil, and draw for ourselves various kinds of eyes, showing the course of the rays of light in each case; then add the various kinds of lenses, and note how they will affect things; and, finally, we may draw pictures of what would happen if the glasses that we ordered were too strong, either in one direction or the other. When we have gone through all this, we may believe that we have done justice to the subject.

Everything about the eye that we have studied hitherto, from the eyelashes onwards, exists in order to serve the retina. This is one of the most wonderful things in the whole body. We are to think of it as part of the eye, but we must also—if we are really to understand it—think of it as part of the brain. We remember that it actually grew out from the brain, and, when we come to look at it, we find that it is indeed an immensely complicated structure made up chiefly of delicate nerve-fibres and nerve-cells.

A PART OF THE EYE THAT IS REALLY A PART OF THE BRAIN

There is also in it, as in every other part of the body, a certain amount of supporting tissue, the business of which is just to hold the rest together. Now, it is very interesting to discover that this supporting tissue of the retina is made of a special kind of cell which we find inside the brain itself, forming the supporting tissue there.

This alone would be a proof of what we know on many other grounds, that the retina of the eye of backboned animals is an outgrowth from the brain.

The various parts of the retina are usually described as being arranged in ten layers, but it is not necessary for us to study them all. Some of these layers consist of cells and others of nerve-fibres. It is the ninth layer from the front that we must carefully look at, because here we find the cells which are most deeply concerned with seeing. We might expect these cells to be in the very front of the retina, immediately behind the glassy jelly of the eyeball, but, in point of fact, they are not, and the light has to pass through no fewer than eight layers of various structure before it finally reaches the true vision-cells.

We must understand that these layers are extremely thin and delicate, and are only to be made out under a microscope of very high power. So what happens is not as impossible as it might sound, if we thought that these various layers were thick things and liable to disturb the light-rays. They do not do so to any degree that matters.

HOW PART OF THE BRAIN GROWS OUT AND FORMS THE RETINA

The inside of the brain is hollow and lined with cells. The brain part of the eye is formed by a hollow outgrowth from the brain, and that outgrowth becomes indented to form the retina. The vision-cells are not on the front of the retina, but close to the back of it. They are really the same as the cells that line the cavity of the brain, and when the brain sends out its little bulb on the way to make the eye, these cells line that bulb, which we can see on page 4425.

The vision-cells are of two kinds, called rods and cones from their shape. They form altogether a regular palisade of cells upon which the light strikes, and if the refracting materials in front are just right, then the light is sharply focussed just where it reaches the retina. There are far more rods than cones in the eye, but there can be no doubt that the cones are more important, as we shall see.

In every retina, there are two spots which differ from the rest of it. One is the place where the great optic nerve spreads out, so to speak, to form the retina. At that point there are no rods or cones, and so it is blind. Light falling on that point is not seen.

THE SPOT IN THE EYE THAT IS BLIND AND THE SPOT THAT SEES BEST

Close beside this blind spot is another which is called the yellow spot, and as the one spot is blind, so the other is the part of the retina where all the best seeing is really done. It is packed with cones and nothing else. That is why we say that the cones are more important than the rods. This spot is called yellow because there is a certain amount of yellow material lying in the

supporting tissue between the cells there. We do not as yet quite know the reason why it is there.

On careful study of the yellow spot, we notice that every kind of arrangement has been made in order to promote good seeing there. The eight layers that lie in front of the cones—we have seen they lie in front of the vision-cells everywhere in the retina—are at their very thinnest in this particular place. Some of them, indeed, are practically not to be found. Also, there are no large blood-vessels to get in the way of the light, but only extremely small capillaries.

All our best seeing is done by means of this spot. Whenever we wish to see a thing precisely, we turn our eyes so that the light from it shall fall upon the yellow spot, and the great business of the muscles that move the eyeballs is to move them together in such a way that the light of any particular thing that we want to see shall exactly fall on the two yellow spots, the one to be found in each eye.

THE WONDERFUL LITTLE CONES THAT HELP US TO SEE COLORS

Quite lately a great deal of interesting work has been done in studying the retina, and especially the region of the yellow spot, in various kinds of animals. Not enough has yet been done for us to go much into detail about it, but it seems quite clear that the cones are more wonderful than the rods, and can do more.

The cones appear much later than the rods in the age-long history of the progress of backboned animals, and it seems especially that the gathering together of cones into one place, without any rods at all, so as to form a yellow spot, only occurs in the highest kinds of backboned animals—namely, the birds and the mammals. There is also good reason to believe that throughout the whole retina, but especially in the neighborhood of the yellow spot, there has been a gradual evolution in the matter of seeing colors, and it is these wonderful cones that are responsible for this.

It seems to have been proved that if two things are to be seen as two, the light from them must fall upon two cones in the retina. If the two things are so small, or if they are so far away and so close to each other that the light from them only falls on one cone in the retina, they are seen as only one thing. This is the case with the double stars which are so extremely common in the sky; so much so, indeed, that every advance in the structure of the telescope shows us that more and more stars, which we had thought to be single, are really double.

WHY WE SEE BEST WHERE THE CONES OF THE EYE ARE TIGHTLY PACKED

When the eye is unaided, the light from the two stars falls only on one cone, and so to us it is only one star. Every time an astronomer resolves a star, as it is said, into two, what happens is that the telescope has spread the light out sufficiently for it to strike two cones in the retina. Evidently the fineness of vision will depend on the nearness of the cones to each other, and that means that it is greatly to our advantage to see with the part of the eye where the cones are tightly packed up against one another without any rods or anything else separating them. That, of course, is what the yellow spot does for those of the higher animals in which it has been developed.

Careful study of these facts makes it certain that for every cone in the retina there must be a special path in the optic nerve, and at least one special cell—perhaps a thousand—in the vision centre of the brain. We have used the phrase "the region of the yellow spot," because around the spot itself, where there is nothing but cones, there is an area of the retina with a good proportion of cones, but towards the edge of the retina there are scarcely any cones at all, and it is practically made up of rods.

THE LITTLE RODS OF THE EYE THAT HELP US TO SEE IN A DIM LIGHT

It has quite lately been shown that the rods have the business of helping us to see in dim light, which the cones do not notice. Ordinary daylight is so bright that the rods are exhausted by it and made useless; therefore in such light we see by the cones only. But the case is different if the rods are shielded from bright light for a little. When this happens they get time to remake the chemical substances which are necessary for their work, and then they can act. Let us see how this works

out. When we go into a dimly-lighted room, or when we go out of doors from a brightly-lighted room, upon a moonless but starlit night, we know that, at first, we see practically nothing, and then afterwards we begin to see. Until quite lately it was supposed that the reason of this was simply that we have to wait for the pupil to expand in the dimmer light so that more light may enter the eye. That is true, to be sure, but we now know that it is less than half the truth.

WHY WE CANNOT SEE WHEN WE GO SUDDENLY OUT OF A BRILLIANT LIGHT

The principal reason why we cannot see at first in such cases is that the rods of the retina are exhausted by the bright light to which they have been exposed, and the cones cannot see in a dim light. But after a few minutes the rods regain their power, as the blood is always flowing rapidly through the retina, rich in materials from which the rods can make the special substances upon which light acts when we see. So, after a little while, we begin to see again, but we see no colors. The rods are unable to distinguish one color from another; if they see at all, they see a sort of bluish grey.

Now, suppose we have gone out of doors on a starlit night, and suppose we notice a star, not too bright a star. As long as we do not look straight at it, we shall see it, but directly we look straight at it, so as to see it as well as possible, it disappears. Before we go on any farther, let us try to think out the reason for ourselves.

The reason is that, as we have already learned, when we look straight at anything we place our eyeballs so that the light shall fall directly upon the yellow spot. But there are no rods, only cones, at the yellow spot, and as the cones do not take any notice of very faint light, the star disappears.

THE DIFFERENT WAYS IN WHICH THE RODS AND THE CONES SEE LIGHT

Still more has been found out about the rods and cones within the last few years. Whatever kind of light falls on the rods, they see only the color—if it can be called a color—that we have described. This has a very interesting result if we spread out the light of the sun by means of a prism. Ordinarily, if it is nice and bright, we see a band of beautiful colors. It is the cones in our retina that enable us to do this. But if we make the band or spectrum very dim, the cones will be blind to it, and we can only see it by the rods. Its appearance now changes, because our power of seeing color has gone, and all we see is a band of dim grey light, a little shortened at the red end—or, rather, the end which was red when it was brighter and the cones could see the color. The reason why the band seems shortened is that the red rays of the spectrum do not affect the rods at all, while all the other rays produce the dim grey light we have already mentioned.

These discoveries teach us how valuable and important the cones are, and what a great advance in the history of vision it was when the cones first appeared, and especially when they were gathered together to form the yellow spot. We have said that the rods and cones form the ninth layer of the retina. Still deeper is the tenth and last layer of the retina, composed of cells which are filled with a dark brown material.

HOW THE PIGMENT-CELLS GIVE POWER TO THE RODS AND CONES

These pigment-cells, as they are called, seem to be very important and useful. For one thing, under the influence of light we find that the pigment seems to run into the ninth layer, so as to form a little dark sheath around each rod and cone. This may be very important in enabling each of the vision-cells to act without getting muddled with the others.

Further, the pigment in the pigment-cells makes a great store of material, on which the vision-cells themselves can draw. Unless these vision-cells, the rods and cones, are properly supplied with the materials they need, and unless that supply is steadily kept up, they lose their power.

In another part of this book we have read that we can blind the eye by merely pressing on the eyeball for two or three seconds, because in doing so we retard the flow of blood—that is to say, the flow of new food materials through the retina. The colored matter inside the vision-cells is bleached by light, and when the cells are bleached they cannot see; so we know that the fresh supply must be continually kept up. If we knew more about the eight front layers

of the retina, we should very probably find that they are as interesting and important as the deepest two layers, about which we have learned a little. But we must wait for more knowledge about them.

A LAW ABOUT THE EYE THAT IS TRUE OF ALL OUR SENSES

It is a law about the action of the retina, and it is also true of the other senses, that what we feel is not in simple proportion to the intensity or strength of what excites us. We might suppose, if we did not know, that what would happen is this: add so much to the brightness of the light, and we should feel accordingly; do it again and again and again, and the result will always correspond.

But that is not the case, as we all know when we come to think of it. Add one candle to one candle, and we know the difference; add one to ten, and we scarcely know the difference; add one to fifty, and no one would notice the difference; add one voice to four voices, and we all know the difference; add one to forty, and no one could tell. In other words, the greater the outside power that excites our senses, the greater is the amount that we must add to it in order that we shall know the difference.

If this were the right place for it, it might be shown that this law is true of all our lives, and is most important every day. It means that the higher the pitch of our talking or of our writing, of our newspapers or of our feelings, the more difficult it is to increase the impression made by them. The man who is always speaking in a loud, shouting voice must shout very much louder if he is to excite our attention; but the person who always speaks in a low, soft, gentle voice has only to raise it the least little bit, and we at once give him all attention.

DO WE STOP SEEING AS SOON AS THE LIGHT GOES?

This law is true of all sensations and feelings, and of all our responses; it is probably true of every kind of living matter, and its discovery was one of the great feats of the nineteenth century. We mention it here because it can be very beautifully studied in the case of the retina, and everyone will agree how interesting it is to find that what we prove for the retina is true of all life.

The question of time is very important in regard to the action of the retina. Do we see directly the light strikes us? Do we stop seeing directly the light ceases? The answer is No to both these questions, as it is in all cases of sensation.

It takes a little time for the light to act before we see. During that time we have little doubt that the light is decomposing the special chemical substances which are lying ready for it in the vision-cells, and it is the changes produced by their decomposition that excite the fibres of the nerve of vision, and send a message to the brain.

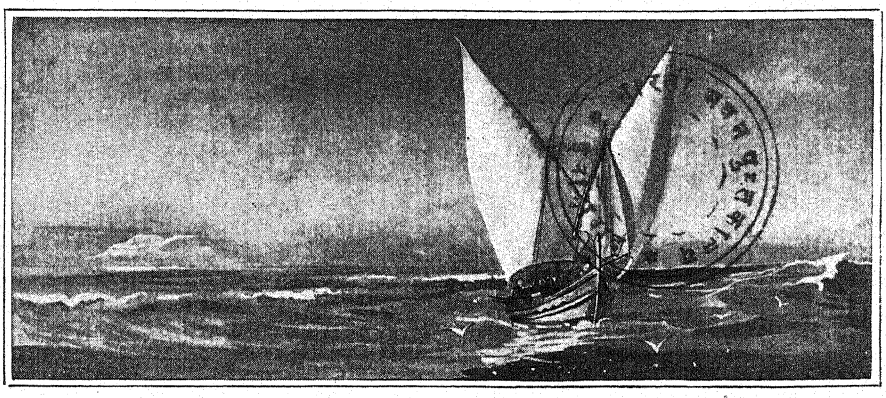
It is probable that people vary within rather wide limits in regard to the period between the striking of the light and the sensation of its presence. We notice a similar thing in other cases, and not only in cases of sensation, for we find that there is always a period, perhaps about the hundredth of a second, between the moment at which a nerve says to a muscle "Contract" and the moment at which the muscle obeys. In this case, also, we suppose that chemical changes are going on in the muscle-cell which require a little time.

HOW THE CONES SEE THE LIGHT BEFORE THE RODS SEE IT

Quite lately it has been also proved that the different parts of the retina are not the same in this respect. The cones, in every respect of a higher type than the rods—even though they are less sensitive in dim light—are affected by light more quickly than the rods are, and it is possible to prove, by experiment carefully made, that first of all we see by the cones only, and then by the rods, too. This makes a difference to what we see, because when the rods come into action they contribute a sort of uniform grey light to everything equally; whereas, during the moment before that, we were seeing by the cones only, and they, of course, see colors.

Lastly, we find that the retina goes on seeing for a little while after the light has ceased. The duration of this after-sensation varies. If the light is moderate, probably the average length of the after-sensation is about one-fortieth of a second, but sometimes a little longer.

THE NEXT PART OF THIS IS ON PAGE 4523.



THE COUNT OF MONTE CRISTO

PART 2

CONTINUED FROM 4322

IT was not long after Edmond's escape from the Château d'If that the means by which it had been effected were discovered. But as there was no doubt about the sack containing the supposed dead body having been thrown into the sea, it was supposed that the prisoner had only exchanged the living death of his cell for the more merciful death by drowning. Edmond Dantès was "officially dead."

Some two years later the keeper of the Pont du Gard inn, not far from the town of Beaucaire, was, as usual, lounging listlessly at his door, for trade was bad and he had but little custom, when a traveler on horseback dismounted at his door and entered. The stranger proved to be a clergyman of grave and reverend aspect, and the innkeeper made rather a fuss in attending upon him. The visitor, who gave the name of the Abbé Busoni, and whose dark and penetrating eyes seemed to search into the inmost mind of the innkeeper, speedily banished the listlessness of that person, and made him all excitement by recalling the events which had occurred sixteen years before.

The name of the innkeeper was Gaspar Caderousse, which fact the abbé knew, and he astonished Caderousse by showing a minute knowledge of his earlier history. Of Edmond Dantès the innkeeper spoke with much warmth of feeling, and swore that he had ever deeply and sincerely lamented the unhappy fate of that poor young man. The abbé explained that he had been present at the death of Dantès in prison, and said that even in his dying moments the prisoner had protested he was utterly ignorant of the cause of his imprisonment.

"And so he was!" exclaimed Caderousse. "How should he have been otherwise? Ah, Monsieur l'Abbé, the poor fellow told you the truth."

"It was for that reason, then, that he besought me to clear his memory from any stain that might have fallen upon it," said the Abbé Busoni, who went on to tell, to the growing excitement of Caderousse, how a fellow-prisoner of Dantès, on being liberated, had given to Edmond a diamond of great value, with which he might have bribed the gaoler; but Edmond had not attempted to do so, and had in turn given it to the abbé, with instructions to sell it at Marseilles and to divide the money equally between five persons —the only five persons who had loved poor Dantès. These were

Mercédès, Danglars, Fernand, Caderousse, and Edmond's aged father. The abbé had heard of the death of old Dantès, and now he was told the old man had died of starvation.

The innkeeper became excited beyond measure, and recounted all he knew of the persons and events connected with Edmond Dantès, although his wife intervened and chided him for telling a stranger so much of private affairs. All that the intelligence of the poor Abbé Faria had been able to guess at from Edmond's own story was confirmed and made plain by the statements of Caderousse, who proved to his visitor that Danglars and Fernand had been the deadly enemies of Edmond.

HOW ALL THE ENEMIES OF EDMOND DANTÈS HAD PROSPERED

But whereas Danglars had prospered and was now rolling in wealth, and Fernand also had risen to great things, being now the Count d'Morcerf, Monsieur Morrel, who had been a real friend to Edmond, and ever an honest man, was in dire extremities, as his great shipping business had met with a series of misfortunes.

The wicked had flourished, and the honest had suffered. Danglars' fortune had been built up by fraud. Fernand, now a distinguished soldier, had made his success when, as a French soldier in the service of the Greeks, he betrayed the Albanian patriot, Ali Pasha, to the Turks, thus getting a traitor's reward from the enemy, as well as stealing the fortune of his victim. The Countess d'Morcerf was the Mercédès who was to have married Edmond, and who had, indeed, truly mourned her lost lover until all hope was lost.

"And M. de Villefort?" asked the abbé. "Do you not know what became of him, and the share he had in Edmond's misfortunes?"

"No; I only know that, some time after having arrested him, he married Mademoiselle de Saint-Méran, and soon after left Marseilles; no doubt but he has been as lucky as the rest; no doubt he is as rich as Danglars, as high in station as Fernand. I only have remained poor, wretched, and forgotten."

THE DIAMOND FOR WHICH CADEROUSSE BECAME A MURDERER

"You are mistaken, my friend," replied the abbé. "God may seem sometimes to forget for a time, while His justice reposes, but there always comes a moment when He remembers—and behold a proof!" As he spoke, the abbé took the diamond from his pocket, and, giving it to Caderousse, said: "Here, my friend, take this diamond; it is yours."

'What! for me only?" cried Caderousse. "Ah, sir, do not jest with me!"

"This diamond was to have been shared among his friends. Edmond had one friend only, and thus it cannot be divided. Take the diamond, then, and sell it; it is worth ten thousand dollars."

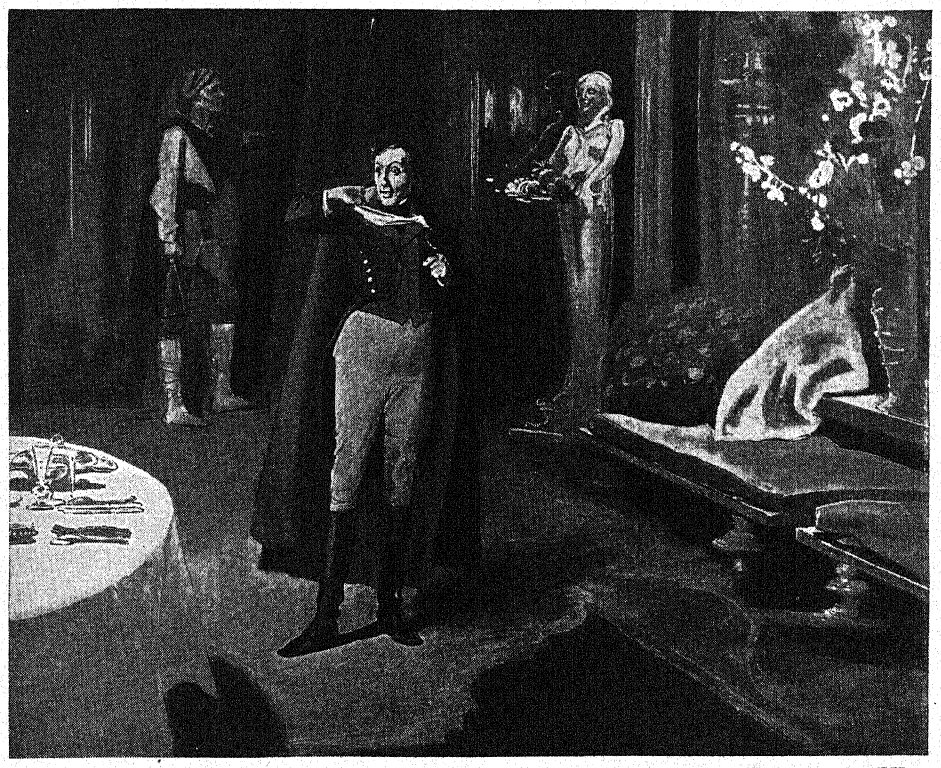
But, alas! this good fortune was the undoing of Caderousse, who was a man of weak and undecided character, and was worthy to be called neither a friend nor an enemy of Dantès. He and his wife, greatly agitated over their new possession, invited a diamond dealer to the lonely Pont du Gard inn to examine and purchase the diamond which the mysterious abbé had given them. The lowest instincts of both husband and wife were inflamed, not only by the sight of the precious stone, but by the thought that they might keep the gem and steal the money from the dealer who had come to buy it. Thus it was that Caderousse became a murderer, and was condemned to the galleys at Toulon.

THE STRANGE COUNT OF MONTE CRISTO COMES TO PARIS

The years passed by, and still all the wicked people concerned in our story seemed to prosper. It was about eight years after the tragedy at Caderousse's inn that a certain Count of Monte Cristo became a great figure in the life of Paris. His name awakened thoughts of romance and dazzling wealth in the minds of all, for he was the hero of a hundred strange stories, more suggestive of the time of the "Arabian Nights" than of the first half of the nineteenth century. It was Albert, the son of the Count d'Morcerf, who first introduced the Count of Monte Cristo to the high society of Paris. They had become acquainted at Rome, where Monte Cristo had been able to render a great service to the Viscount Albert d'Morcerf, and his friend, the Baron Franz d'Epinay.

This Monte Cristo was a tall man, with a lithe, agile figure, capable of the greatest exertion. While his face was pale to ghastliness, his eyes were large, and gleamed at times with an uncanny

light. His hair was black as jet, making the deadly paleness of his countenance the more pronounced. Baron Franz was convinced that he had met this strange man before. He had landed on one occasion on the island of Monte Cristo, and there he had encountered a band of smugglers, whose chief invited him to dinner. After he had been blindfolded, he was led into a cave, which was fitted up with the most marvelous luxury; and there he was entertained at a wonderful banquet. This was concluded by his host inviting him to taste some green-



THE BARON HAD BEEN LED BLINDFOLDED INTO A CAVE OF MARVELOUS LUXURY

ish paste contained in a beautiful silver vessel. It was the famous "hashish." After Baron Franz had tasted it, he sank into gorgeous dreams and visions, and when he awoke again, it was to find himself on the seashore, and the most diligent searching never brought him again to the secret entrance of this magic cave. He believed that the chief and Monte Cristo were the same.

All sorts of stories were afloat in Paris as to the history of this Count of Monte Cristo. When he went to the Opera, he was accompanied by a beautiful Greek girl, said to be a princess, named Haidée, whose guardian he was. A well-known lady declared he was a vampire! But the air of mystery about him was just what Paris liked, and the fact that he had unlimited credit at the bank controlled by the Baron Danglars was enough to make him talked about, and to open all doors to him.

There were others than the Baron Franz who thought they had met him before. When he was presented to the Countess d'Morcerf, that lady showed such agitation in meeting him that her son was seriously alarmed. But nothing ruffled Monte Cristo. Calmness and deliberation marked all his movements; in some respects he was more like a machine than a human being. If he made an appointment for nine o'clock, he entered when the clock was striking the fifth of the nine hours. Everything he said he would do was done precisely. And now he began to carry through as certainly and relentlessly as fate the schemes which he had studied in secret.

There was a house of Auteuil, a suburb of Paris, which was to be let. One day,

with his steward, Bertuccio, Monte Cristo drove out to see it, as he had arranged to purchase it.

"Tell them to stop at Rue de la Fontaine, No. 28," said the count, fixing his eyes on the steward, to whom he gave this order. Bertuccio's forehead showed great beads of perspiration when he heard the number of the street mentioned, but he gave the order.

THE STEWARD WHO BELIEVED HIMSELF TO BE A MURDERER

Bertuccio accompanied his master from room to room, showing great uneasiness when they went down a stair that led to the garden; for Monte Cristo seemed to know all that had happened in the house. When his master asked him if he supposed anything had been buried beneath a tree to which he had led the steward, Bertuccio had finally to confess all he knew, saying that the Abbé Busoni was the only one who already knew the story of his crime. Villefort had callously refused justice to Bertuccio many years before, and he had sworn to revenge himself upon him. He had traced him to this house, and in this garden he struck him down in the very instant when Villefort had been preparing to bury a little infant that was still alive. That child Bertuccio had reared, and given him the name of Benedetto; but he had grown to be a scoundrel of the worst type, and was now a criminal outcast.

After this confession, Bertuccio said his master could do with him as he wished, but Monte Cristo set his mind at rest by telling him he had not struck true—that Villefort still lived.

MONTE CRISTO LAYS A DEEP PLOT TO CONFOUND ONE OF HIS ENEMIES

There was a deep-laid scheme in the purchase of this house at Auteuil. The Count of Monte Cristo arranged a dinner-party there. Among those invited were the Baron and Baroness Danglars and M. de Villefort, who, as procureur du roi, or public prosecutor, had long enjoyed power.

The repast was magnificent; Monte Cristo had endeavored completely to overturn the Parisian ideas, and to feed the curiosity as much as the appetite of his guests. It was a veritable fairy banquet, and not only impressed his guests with the enormous wealth of their host, but with his exhaustless ingenuity in producing surprises for them. After dinner Monte Cristo led the conversation on to the subject of the tragedies of old houses. If that house could but tell what had happened in it years ago, how interesting and terrible it might be! And so, step by step, he took his party from room to room, and down the stairs into the garden, telling them the strange story of a child that had been buried there, which the gloomy old house seemed to have told to him. Certain of the guests were painfully excited by the count's rehearsal, as he had meant them to be, and M. de Villefort had to confess to himself that he was in the hands of Fate personified by this terrible and mysterious man known as the Count of Monte Cristo.

Villefort had a daughter by his first wife, for he had married a second time. Her name was Valentine, and at the command of her father, but not by her own wish, she was engaged to be married to the Baron Franz d'Epinay. This beautiful girl was in love with a gallant young military officer named Maximilian Morrel, son of the Marseilles shipowner. But neither of them had dared to avow their affection for each other to Valentine's father.

THE MAN WHO SIGNED HIMSELF "SINDBAD THE SAILOR"

It was Franz, however, who told Maximilian that among the stories of Monte Cristo it was said he often gave great gifts of money to help deserving people, and signed himself "Sindbad the Sailor." This was great news for Maximilian, for his father had been saved from ruin by a generous gift from an unknown benefactor who had signed himself Sindbad the Sailor. He hastened at once to the house of Monte Cristo to thank him for his generosity, and from that day became a devoted admirer of the strange man. His inmost thoughts he told to him, and all the story of his hopeless love for Valentine.

Meanwhile the tide of fortune seemed to have turned with Baron Danglars. His business had suffered many losses, but his greatest loss of all was due to some false news about the price of stocks and shares which had been telegraphed to Paris by means which Monte Cristo could have explained. The

baron's daughter was engaged to Albert d'Morcerf, but the Count d'Morcerf had now come under a cloud, for his betrayal of Ali Pasha had been made public; and perhaps the Count of Monte Cristo could have told how the truth had come out at last. So the baron did not hesitate to break the engagement and to accept as the suitor for his daughter a dashing young man known as Count Cavalcanti, who had been introduced to Paris by Monte Cristo, but concerning whose antecedents nothing at all seemed to be known.

THE DOWNFALL OF THE FIRST OF DANTÈS' ENEMIES

The Count d'Morcerf was tried for his betrayal of Ali, and seemed likely to be acquitted, when a veiled woman was brought to the place of trial and testified before the committee that she was the daughter of Ali Pasha, and that Morcerf had not only betrayed her father to the Turks, but had sold her and her mother into slavery. The veiled woman was Haidée, the ward of Monte Cristo. The Count d'Morcerf was now a ruined man, and when his son Albert discovered the part that Monte Cristo had played, he publicly insulted the count at the Opera, and had the immediate satisfaction of being granted an opportunity to revenge himself in a duel, which was to take place the next morning, with pistols, in the Bois de Vincennes. But that night the Countess d'Morcerf appealed to Monte Cristo not to kill her son. In the course of her tearful interview Mercédès learned from the lips of Edmond Dantès himself—for she had never doubted that Monte Cristo was he—how her husband had betrayed him, and the infamy of Danglars and Villefort as well.

"But what you ask of me you shall have," said he. "Your son shall live."

MERCÉDÈS PLEADS WITH DANTÈS TO SPARE THE LIFE OF HER SON

"Oh," said she, seizing the count's hand and raising it to her lips—"oh, thank you, thank you, Edmond! Now, you are exactly what I dreamed you were, such as I have always loved you. Oh, now I may say so!"

"So much the better," replied Monte Cristo, "as that poor Edmond will not have long to be loved by you. Death is about to return to the tomb, the phantom to retire in darkness."

"What do you say, Edmond?"

"I say, since you command me, Mercédès, I must die."

"Die! And who told you so? Who talks of dying? Whence have you these ideas of death?"

"You do not suppose that, publicly outraged in the face of a whole theatre, in the presence of your friends and those of your son—challenged by a boy, who will glory in my pardon as in a victory—you do not suppose I can for one moment wish to live. What I most loved after you, Mercédès, was myself, my dignity, and that strength which rendered me superior to other men; that strength was my life. With one word you have crushed it, and I die."

But the duel was averted, as Albert publicly apologized to the count, and, furious that he had not been avenged by his son, Morcerf rushed to the house of Monte Cristo.

"I came to tell you," said Morcerf, "that as the young people of the present day will not fight, it remains for us to do it."

"So much the better," said Monte Cristo. "Are you prepared?"

DANTÈS' HOUR OF VENGEANCE ON HIS FIRST BETRAYER, FERNAND

"Yes, sir; and the absence of witnesses is of no account, as we know each other so little."

"Truly they are unnecessary," said Monte Cristo, "but for the reason that we know each other well. Are you not the soldier Fernand who deserted on the eve of Waterloo? Are you not the Lieutenant Fernand who served as guide and spy to the French army in Spain? Are you not the Captain Fernand who betrayed, sold, and murdered his benefactor, Ali? And have not all these Fernands, united, made the Lieutenant-General Count d'Morcerf, peer of France?"

"Oh," cried the general, "wretch, to reproach me with my shame. Tell me your real name that I may pronounce it when I plunge my sword through your heart."

At this Monte Cristo, bounding to a dressing-room near his bedroom, quickly pulled off his coat and waistcoat and his cravat, and, donning a sailor's jacket and hat, was back in an instant.

Morcerf, when he saw him again, felt his teeth chatter and his legs sink under him, so that he had to support himself by a table.

"Fernand," cried Monte Cristo, "of my hundred names I need only tell you one to overwhelm you. But you guess it now, do you not?—or, rather, you remember it? For, notwithstanding all my sorrows and my tortures, I show you to-day a face which the happiness of revenge makes young again—a face you must often have seen in your dreams since your marriage with my betrothed!"

Gazing for a moment in terror at this man who seemed to have risen from the dead to avenge his wrongs, Morcerf turned, seeking the wall to support him, glided along close to it until he reached the door, by which he went out backwards, uttering the one distressing cry—"Edmond Dantès!"

Events marched rapidly now, and Paris had scarcely ceased talking of the suicide of the Count d'Morcerf, when Cavalcanti was arrested for the murder of a fellow-convict named Caderousse, who had been blackmailing him. Caderousse had identified Cavalcanti as a former galley-slave named Benedetto.

THE FALL OF BARON DANGLARS AND HIS FLIGHT FROM FRANCE

It now came out that both Benedetto and Caderousse had been liberated by a mysterious Englishman who had spent large sums of money to enable them to escape. The Englishman's name was Lord Wilmore, but he and the Abbé Busoni and the Count of Monte Cristo were the same person, though the police knew it not!

Danglars fled from France, his great business in ruin, and with him he took a large sum of money belonging to the Paris hospitals.

In the household of Villefort, Monte Cristo had done nothing to bring vengeance on that evil man. He had seen from the first that Villefort's second wife took great interest in chemistry, because she was studying the art of poisoning, and he felt that revenge was already at work here. There had already been two mysterious deaths in the Villefort family, and now the beautiful Valentine, according to the doctor, seemed to be suffering from the early effects of some slow poison.

Maximilian Morrel, in despair of Valentine's life, rushed to Monte Cristo for his advice and assistance.

"Must I let one of the accursed race escape?" Monte Cristo asked himself, but decided, for Maximilian's sake, that he would save Valentine.

VENGEANCE AT WORK IN THE HOME OF DE VILLEFORT

Monte Cristo had bought the house adjoining that of Villefort, and, clearing out the tenants, had engaged workmen to make repairs and alterations. He had made them remove so much of the old wall between the two houses that it was a simple matter for him to take out the remaining stones and pass into a large cupboard in Valentine's room. Here the count watched while Valentine was asleep, and saw Madame de Villefort creep into the room and substitute for the medicine in Valentine's glass a dose of poison.

He then entered the room as Valentine awoke, but before she could cry out in amazement he made her keep silence, and told what he had seen. He threw half the draught into the fireplace, leaving the rest in the glass, and gave Valentine one of his famous pellets of hashish, which made her sink into a death-like sleep. He then retired to watch again, and in a little time Madame de Villefort returned.

Thinking that Valentine had drunk half of the poison, she threw the rest away, but Monte Cristo knew the poison, and, having brought some of the same with him, went in again and half filled the glass.

Next morning the doctor declared that Valentine was dead. In the glass he discovered poison, and as the same poison was found in madame's laboratory, there was no doubt of her guilt. She admitted all, and confessed that her object had been to make her own son the sole heir to Villefort's fortune.

THE TRAGIC FATE OF THE MAN WHO SENT DANTÈS TO THE CHATEAU D'IF

Madame de Villefort fell at her husband's feet. He addressed her with passionate words of reproach as he turned to leave her presence.

"Think of it, madame," he said, "if on my return justice has not been satisfied, I will denounce you with my own mouth, and arrest you with my own hands! I am going to the court to pronounce sentence of death on a

murderer. If I find you alive on my return, you shall sleep to-night in gaol."

Madame sighed, her nerves gave way, and she sank on the carpet.

"Farewell, madame, farewell!" said her husband, as he left the room.

But Villefort little knew at the moment he spoke these burning words to the woman who was his wife that he himself was not going out to condemn a fellow-sinner, but to be himself condemned. For the man to whom he referred as a murderer was the so-called Count Cavalcanti, really Benedetto, and the night before the criminal had had a long interview with Bertuccio, who had disclosed to the prisoner the secret of his birth.



IT WAS NO DREAM, FOR VALENTINE STOOD THERE, RESCUED FROM DEATH BY MONTE CRISTO

Benedetto appeared in court dressed in the most elegant manner and showing no sign of anxiety. Villefort had never been more eloquent than he was in describing to the court the character of the prisoner's crime. When the president of the court asked Benedetto his age, he replied:

"I am twenty-one years old; or, rather, I shall be in a few days, as I was born on the night of the 27th of September, 1817." M. de Villefort, who was busy taking down some notes, raised his head on hearing the date.

"Where were you born?" continued the president.

"At Auteuil, near Paris." M. de Villefort a second time raised his head, looked at Benedetto as if he had been gazing at the head of Medusa, and became livid. As for Benedetto, he gracefully wiped his lips with a fine cambric pocket-handkerchief.

"Your profession?"

"First I was a forger," answered Andrea, as calmly as possible; "then I became a thief; and lately have become an assassin."

A murmur, or, rather, a storm of indignation, burst from all parts of the assembly. The judges themselves appeared stupefied; and the jury manifested tokens of disgust for a stoicism so unexpected from a fashionable man. M. de Villefort pressed his hand upon his brow, which was now red and burning; then he suddenly rose, and looked around as though he had lost his senses.

The president next asked the accused to state his name, to which he politely replied that, while he could not tell his own name, he knew his father's. His father, he declared, was Villefort, the public prosecutor! This statement made a great commotion in the court, and all eyes were on Villefort, while Benedetto continued to answer the questions of the president, and proved that he was the child whom Villefort would have buried alive that night when Bertuccio thought he had revenged himself upon Villefort in the garden of the house at 28, Rue de la Fontaine, Auteuil. But the public prosecutor himself confirmed the prisoner's story by admitting his guilt, and declaring that he held himself at the disposal of the public prosecutor who would succeed him.

As he spoke these words with a hoarse, choking voice, he staggered towards the door, and so from the court, which was stricken dumb with amazement for the moment. The president adjourned the sitting, and all fell to discussing the strange turn of events.

VENGEANCE, SLOW BUT TERRIBLE, OVERTAKES THE ARCH-VILLAIN OF THE STORY

When Villefort arrived at his own house he found everything in confusion. Making his way to his wife's apartments, he had the horror of meeting her while she still lived, but just at the very instant when the poison she had taken did its work. His thoughts were now for his son, Edward, and after a search he found the child asleep, as he thought, upon a sofa. But as he lifted him up a folded paper fell from the child's breast, and, thunder-struck, his father dropped on his knees and let the body of the boy rest on the floor beside his mother. Villefort picked up the paper and read in his wife's writing:

"You know that I was a good mother, since it was for my son's sake I became criminal. A good mother cannot depart without her son."

This was more than the brain of man could endure, and Villefort turned from the tragic scene a raving madman, rushed wildly to the garden, and began to dig with a spade.

It was not long after this that the Baron Danglars was cleverly entrapped by some brigands in the catacombs of St. Sebastian, some little way outside Rome, and there, instead of being held to ransom, he was made to pay such fabulous sums for food and lodging that the money he had stolen from the charities on running away from Paris was very quickly transferred to the pockets of the brigands. But at length Monte Cristo appeared to the prisoner, and, after accusing him of his crimes, told him that he was in the hands of Edmond Dantès. At this Danglars uttered a cry and fell prostrate.

THE WAY THAT MONTE CRISTO PUNISHED BARON DANGLARS

"Rise," said the count. "Your life is safe; the same good fortune has not happened to your accomplices; one is mad, the other dead. Keep the 50,000 francs you have left, I give them to you. The 5,000,000 you stole from the hospitals has been restored by an unknown hand. And now eat and drink, and when you are satisfied you shall be free."

Danglars stayed that night with the brigands, but in the morning he found himself lying near a stream. Being thirsty he dragged himself towards it, and as he stooped to drink he perceived that his hair had become quite white.

The vengeance of Edmond Dantès, so long delayed, so carefully and laboriously planned, was now complete, and it only remained for him to perform the last of his marvels, at the same time giving proof of his boundless generosity. Valentine de Villefort had been buried, and Maximilian was in despair; but Monte Cristo urged the young man to have patience and hope, and as his father had been a father to Edmond Dantès, so would Dantès be a father to him.

MONTE CRISTO MAKES A STRANGE BARGAIN WITH MAXIMILIAN MORREL

It seemed a strange thing to ask a lover whose sweetheart had been placed within the tomb to have hope and to come to Monte Cristo in one year. But this was the bargain they made.

Mercédès and her son had meanwhile given to charities the ill-gotten fortune left by Fernand. Monte Cristo had bought the house his father lived in at Marseilles, and in the garden there he had buried the dowry he had originally saved up when he was to be married to Mercédès. This house and the buried dowry he now gave to her, and there the beautiful countess spent her days in the simplest way, her son helping her also from his pay as an army officer.

When the year had passed during which Monte Cristo had bidden Maximilian Morrel to hope, the two met at Marseilles, and then went by yacht to the island of Monte Cristo. Seated in the mysterious cave, the count asked him whether he was still of the same mind, and he replied that nothing had touched his grief at the loss of Valentine. He was still resolved to die. It was yet three hours from the time until which Maximilian had promised to remain alive. The two friends talked much about the joys and sorrows of life as they sat there in that strange room, where the statues that stood around the banqueting-table had silver baskets always full of fruit, no matter how much was taken away. At last the count gave Maximilian a spoonful of a mysterious substance which was supposed to effect a painless death.

HOW TWO LOVERS WERE STRANGELY UNITED, THANKS TO MONTE CRISTO

Just as the young man seemed to be sinking softly into unconsciousness he saw Monte Cristo open a door leading to another room, and on the threshold, illumined by a strong light, stood a beautiful young woman, the picture of the beloved Valentine. This was no dream, and Morrel was not dying. It was indeed Valentine, who, when she was supposed to have died, was only in a trance, induced by the pellet given to her by the count. Monte Cristo had rescued her from the tomb, revived her, and for these twelve months, while the love of Morrel had stood its test, Valentine had been the companion of Haidée. As the truth of his new-found happiness dawned upon the faithful young man, Monte Cristo had some real reward for the service he had rendered the lovers; and when he learned that he was himself as much beloved by Haidée as Maximilian was by Valentine, it seemed to this strange and wonderful man that life might still have a greater happiness for him than the fulfilment of his vengeance.

Next morning, when Valentine and Maximilian met and went out to the beach, Jacopo, the captain of Monte Cristo's yacht, had a letter for them, which Morrel opened and read.

"MY DEAR MAXIMILIAN,

"There is a felucca for you at anchor. Jacopo will conduct you to Leghorn, where M. Noirtier awaits his granddaughter, whom he wishes to bless before you lead her to the altar. All that is in this grotto, my friend, my house in the Champs Elysées, and my château at Tréport, are the marriage gifts bestowed by Edmond Dantès upon the son of his old master, Morrel. Mademoiselle de Villefort will share them with you; for I entreat her to give to the poor the immense fortune reverting to her from her father, now a madman, and her brother, who died last September with his mother. Tell the angel who will watch over your future destiny, Morrel, to pray sometimes for a man who, like Satan, thought himself, for an instant, equal to God, but who now acknowledges, with Christian humility, that God alone possesses supreme power and infinite wisdom. Perhaps those prayers may soften the remorse he feels in his heart. As for you, Morrel, this is the secret of my conduct towards you. There is neither happiness nor misery in the world; there is only the comparison of one state with another, nothing more. He who has felt the deepest grief is best able to experience supreme happiness. We must have felt what it is to die, Morrel, that we may appreciate the enjoyments of life.

"Live, then, and be happy, beloved children of my heart! And never forget that, until the day when God will deign to reveal the future to man, human wisdom is contained in these two words—*wait* and *hope*.

"Your friend,

"EDMOND DANTÈS,

"Count de Monte-Cristo."

THE LAST WORDS OF MONTE CRISTO AND THE LAST WE HEAR OF HIM

"But where is the count?" asked Morrel eagerly. Jacopo pointed towards the horizon where a white sail was visible.

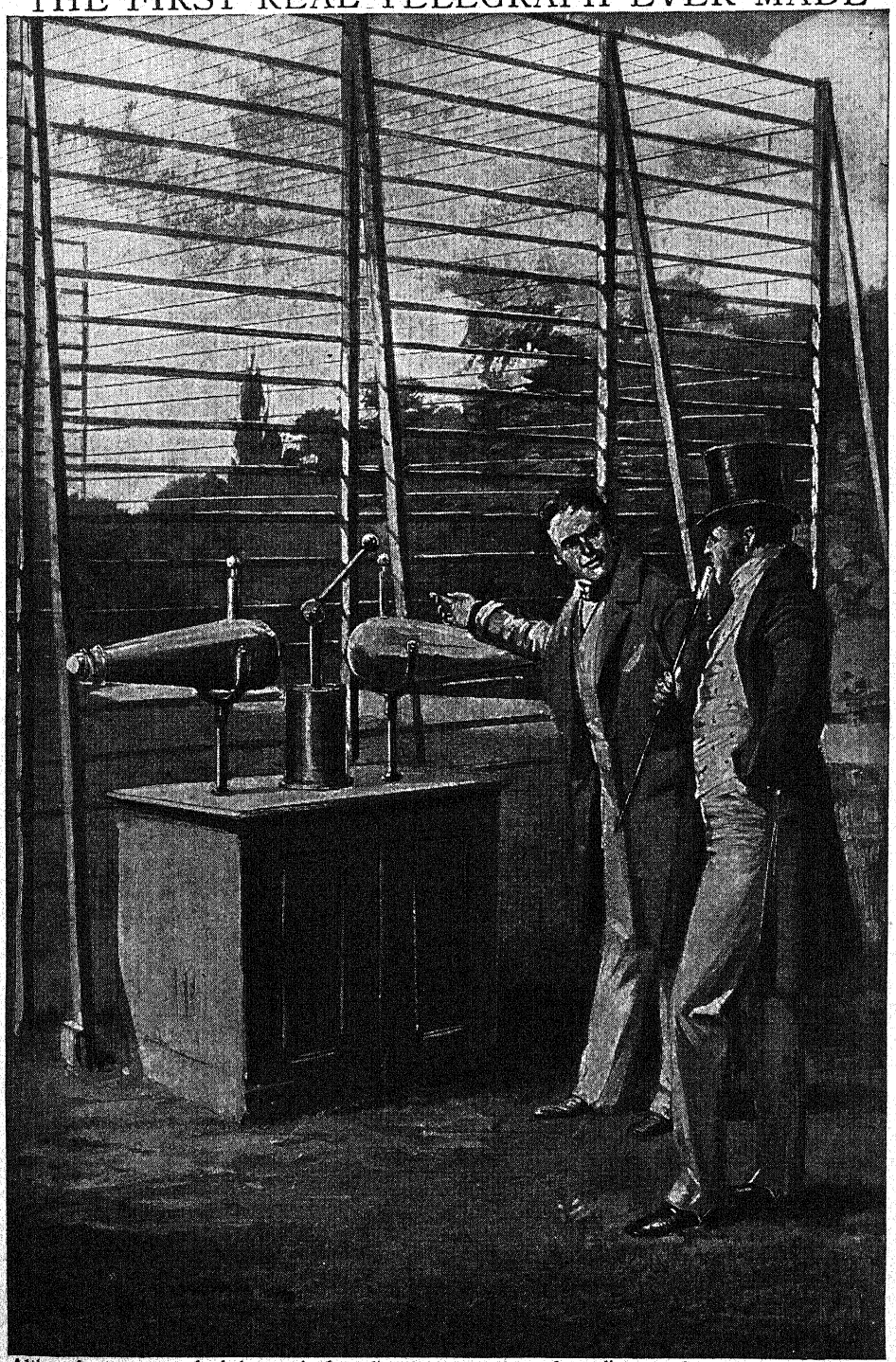
"And where is Haidée?" asked Valentine. Jacopo still pointed towards the sail.

"Gone!" said Morrel. "Adieu, my friend. Who can say whether we shall ever meet them again?" His eyes were filled with tears.

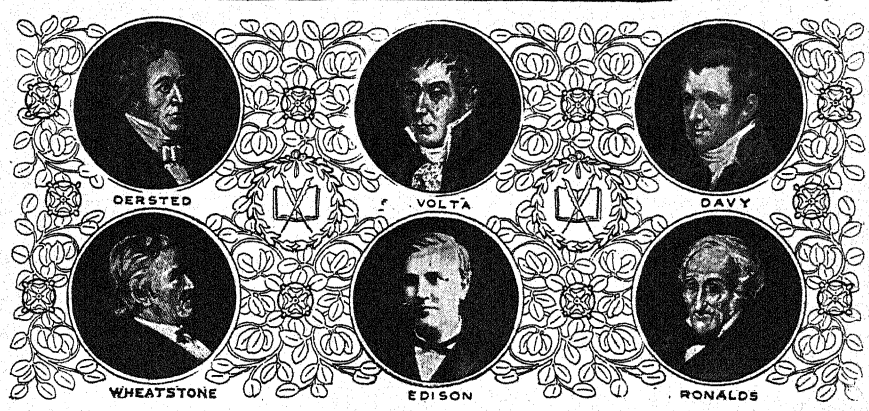
"My friend," said Valentine, "has not the count just told us that all human wisdom is contained in these two words—*wait* and *hope*?"

THE NEXT FAMOUS BOOKS ARE ON PAGE 4639.

THE FIRST REAL TELEGRAPH EVER MADE



Although many men had dreamed of sending messages across long distances by electricity, it was an Englishman, Sir Francis Ronalds, who was the inventor of the first real electric telegraph. Here we see the arrangement by which he erected eight miles of wire in the garden of his house at Hammersmith, the house that was afterwards occupied by the poet and reformer, William Morris. Ronalds offered his invention to the British Admiralty, but it was rejected on the ground that telegraphs were unnecessary.



THE MAKERS OF TELEGRAPHS AND TELEPHONES

CONTINUED FROM 4368



NO one can tell us in a sentence who made the telegraphs and telephones. There have been too many men concerned in these inventions for the story to be given in few words. The savage who lights a fire, so that the smoke may be seen from afar by his comrades, is using a telegraph such as all men used once upon a time. The army signaler who waves two flags about in a particular manner is telegraphing. The man who uses the heliograph—a mirror which reflects the rays of the sun—is using another old-time method of telegraphing signals.

Every boy and girl who has used a piece of looking-glass to reflect the rays of the sun into dark corners has been making use of the heliograph without thinking of the wonder that he or she was performing. Boys and girls call the dancing light which they make with their little mirrors a Jack-o-Dandy. It is worth remembering, when we use them, that this sort of thing, on a much greater scale, of course, used to serve as a telegraph apparatus for the whole of Algeria nearly a thousand years ago. By an arrangement of large mirrors they used to telegraph with sun-rays from one end of the country to the other. And to-day the people in California use the same contrivance, and with their mirrors telegraph, by the aid of the sun, nearly two hundred miles. We do not know who first thought of using a mirror and the sunshine to telegraph. Many of the most wonderful things in the world were done by men whose names remain unknown.

We do not know for certain the name of the man who first suggested the electric telegraph, which everybody really means now when he talks about the telegraph. Of course, the way of working it is very different from the working of any other telegraph; but we can see that the same forces of Nature serve to carry the sight of the savage's camp-fire smoke and the reflected rays of the sun and the mysterious electric message which flits with the speed of light along the telegraph wires, or without wires at all, simply through the open air.

The way for the telegraph was being prepared, piece by piece, by those clever, painstaking men who found out about electricity for us in the manner described on page 2161. They never dreamed to what they were leading. They loved knowledge for its own sake, and little thought of the tremendous gift that they were

giving to the world. If we would find the very cradle of the electric telegraph, we ought to seek it in the glass tube from which the jolly Bluecoat boy, Stephen Gray, about whom we read on page 2163, sent a current of electricity for a distance of nearly 900 feet along a little cable. Sir William Watson, as we read on page 2164, did better than this by sending the current from one Leyden jar to another placed two miles away.

THE UNKNOWN MAN WHO WAS THE REAL FATHER OF THE TELEGRAPH

This was interesting, and was wonderful new learning for the scientists; but it did not seem to lead anywhere in particular until, in 1753, an unknown man wrote to a paper in Scotland suggesting that we might use these electric currents for sending *messages* to a distance.

He had two schemes. One was to have a wire for each letter of the alphabet, and for a current to be sent along the wire A when that letter was meant. The current would agitate a piece of paper at the receiving end of the wire, and on that piece of paper would be printed the letter A. Or the current might act upon an automatic inker which would print a sign standing for A, or whatever the letter might be. His second proposal was the better one. That was to have only one wire, and for a light ball at the end to be so agitated by the electric current that it should strike a bell and give signals which would stand for letters, and be read off and written down by the person at the receiving end of the telegraph wire.

We do not know who that man was, though some people believe him to have been a Greenock doctor named Charles Morrison. He must have been a man with a very clear mind, for, as we know, the method of giving the electric signals that is in general use everywhere to-day is not so very different from the second suggestion that he made.

THE MANY CLEVER MEN WHO PREPARED THE WAY FOR THE TELEGRAPH

But, no matter what had been proposed then, they had not the means to carry it out. They could not produce electricity in sufficient force to make a good telegraph. The discoveries of Volta, giving the world the Voltaic pile, were seized upon as a royal road to success in the new field. Nearly all the men of this period, of whom we read on pages 2161 to 2170, did something to help by their discoveries, not deliberately, but by placing their knowledge at the disposal of others who were fixing their thoughts on telegraphy. The effects of electricity upon water and upon the salts of minerals, far away as they seem from an ordinary telegram, all had their share in helping towards the end.

Those great men, Humphry Davy, the chemist's apprentice, and Michael Faraday, whom Davy helped to success, were among those who did much for telegraphy at this stage by finding out some of the greatest secrets of electricity and its effects. Oersted, as we read on page 2167, found that an electric current turns the magnetic needle.

All the world might have known this and have been no better off had not Faraday, the poor blacksmith's son, worked on and found out that the magnet will electrify wire through which no current is passing. This led him to show us that we can perform the wonders described on page 2168.

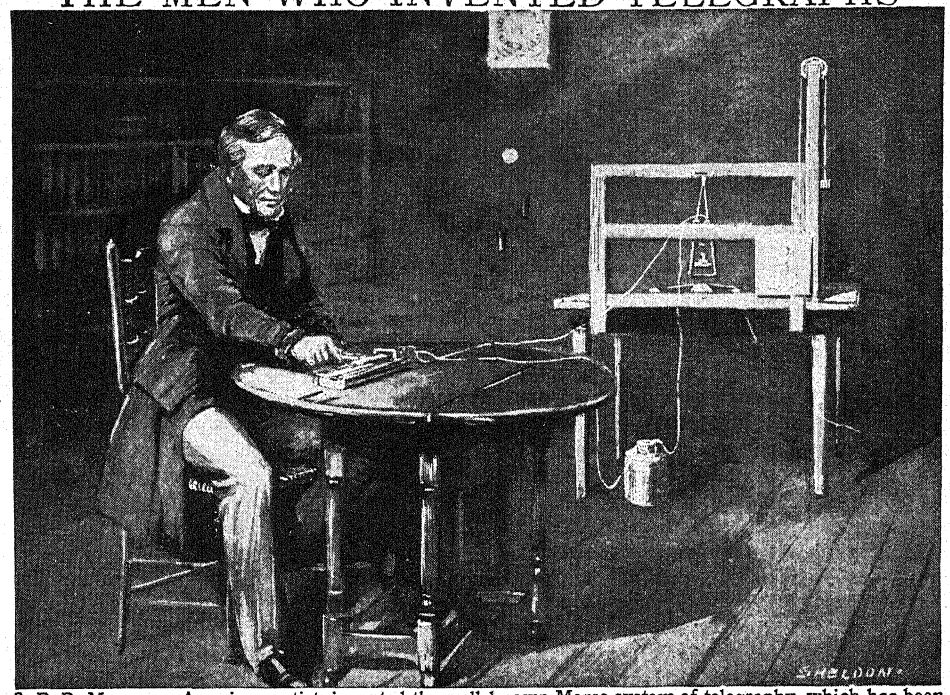
THE FAMOUS DISCOVERY THAT MADE THE ELECTRIC TELEGRAPH POSSIBLE

A great power was thus placed at the command of men. They could create as much electricity as they needed, and could use it as they wanted, without fear of its escaping or of the supply running out, as was bound to happen with the Leyden jar or the Voltaic pile.

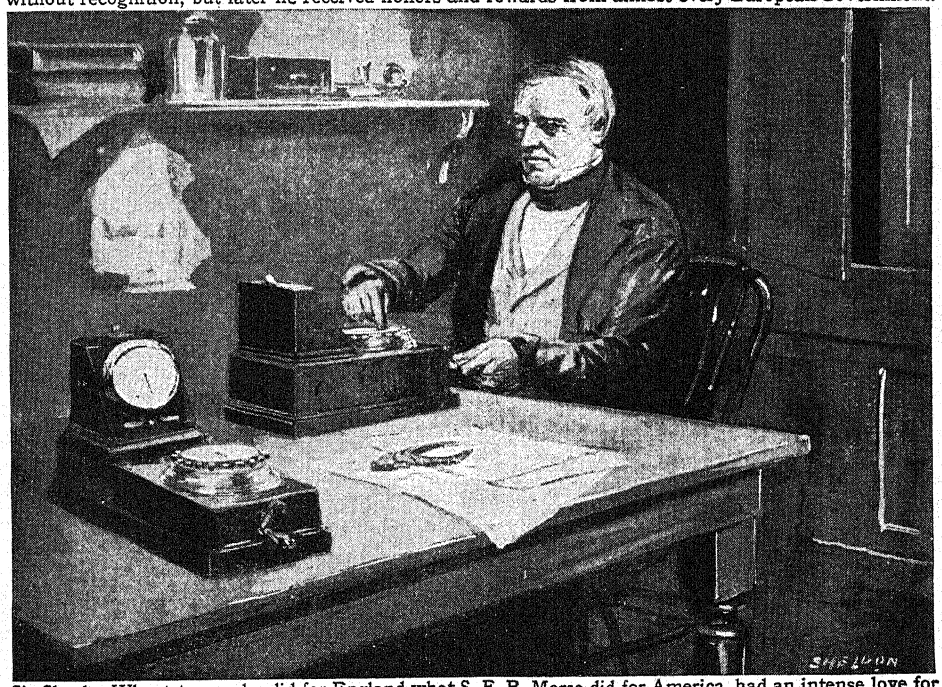
Still, the first real telegraph did not come from Faraday's discovery. It was one which cost its maker a great deal of care and anxiety and money—and disappointment. The inventor was a man named Ronalds, who afterwards became Sir Francis Ronalds. He was the son of a London merchant, and was born in 1788, just when attention was being turned by so many people to the problem of electricity.

When he grew up he gave all his thought to the study, and succeeded in making a telegraph system in his own garden at Hammersmith with wires eight miles long. He made the wires run round the garden many times, so that all this length of wire might be employed. Then he had an arrangement for creating electricity by friction, and he could send a current right through the whole length of his wires. At each end he had

THE MEN WHO INVENTED TELEGRAPHS



S. F. B. Morse, an American artist, invented the well-known Morse system of telegraphy, which has been adopted in almost every part of the world. The first message, "What hath God wrought?" was sent from Washington to Baltimore in 1844. Morse, who is seen in this picture making his experiments, lived for years without recognition, but later he received honors and rewards from almost every European Government.



Sir Charles Wheatstone, who did for England what S. F. B. Morse did for America, had an intense love for science from his childhood. He worked in the shop of a music-seller, but found time to study physics, and after many experiments he invented, with Sir William Cooke, the instrument from which has grown the telegraph system in use throughout the British Isles. Here Sir Charles Wheatstone is working his instrument.

a dial which, acted upon by the current, caused a letter to appear before an opening in the dial. This arrangement was controlled by the action of a pair of pith balls, through which the current passed. Having perfected his machine, Ronalds offered it to the British Government, which at that time had only wooden signals worked by hand for their telegraphs.

A BRITISH GOVERNMENT THAT THOUGHT THE TELEGRAPH UNNECESSARY

But they would not hear of an electric telegraph. "Telegraphs are wholly unnecessary, and no other than the one in use will be employed," they answered. Governments are sometimes very stupid. Ronalds gave up telegraphy, and the field was left to others, and, being a cheerful, unselfish man, he rejoiced that others should succeed where he failed. He saw the telegraph in operation all over the British Isles before he died. The success of the plan is due to Sir Charles Wheatstone, who was born in 1802, and died, two years after Ronalds, in 1875; and to Sir William Fothergill Cooke, who was born in 1806 and died in 1879.

It is strange that these two men should have come together to do this great work. Cooke was, for many years, in the Army in India, and became a doctor. Wheatstone was the son of a Gloucester musical instrument maker, and was sent to London to the shop of an uncle who was a music-seller.

Both loved science, and were specially attracted to the study of electricity. Wheatstone was able to give his time more and more to this pursuit. He became noted for his writings on various scientific subjects, and was appointed a professor at King's College, where he conducted important experiments. Among these was a test of the speed at which an electric current travels along a wire.

HOW WHEATSTONE AND COOKE MADE THE FIRST PRACTICAL TELEGRAPH

Cooke first heard of electricity in connection with the telegraph while he was studying medicine abroad. His quick mind soon saw that there were great possibilities in it; so, giving himself up to the work, he returned to England, and entered into partnership with Wheatstone. The result was excellent. Cooke was a good business man, Wheatstone was a genius. Together they made the first practical telegraph ever used in England. It was first used in 1838, on the London and Blackwall Railway. Like nearly all new things, it was not perfect. It had five lines of wire, which, of course, made it very expensive. In the following year the number of lines was reduced to two, but even this was too costly, so in 1845 the partners brought out a telegraph for which only one wire was required. It was practically the same instrument as that used to-day for small offices in the British Isles.

S. F. B. MORSE, THE PAINTER, WHO INVENTED THE TELEGRAPH FOR AMERICA

Other scientists in England, Germany, France, and America were working at the same time as Wheatstone in the endeavor to make a telegraph instrument that would do practical work. Among them, the greatest of all was Samuel Finley Breese Morse, the American to whom we owe not only the famous Morse telegraph system, but the Morse alphabet, which is used the world over in both electric telegraphy and in signaling. You will find this alphabet on page 3577. Morse was born in Charlestown, Massachusetts, in the year 1791, when Washington was president, and the French Revolution was growing toward fury. His father was a congregational minister, who was noted for the geographies that he wrote, rather than for his sermons. Samuel Morse grew up in an atmosphere of learning, and when he was nineteen graduated from Yale. He then became an artist. He was the first president of the National Academy in New York, and went to Europe twice to study. It was when he was on his voyage back the second time that the incident occurred which turned his attention solely to electricity, in which he had always been interested. The story told is that one day on ship-board, when he was discussing electricity and the electro-magnet with other passengers, the idea of his telegraph apparatus came to him. Voyages were slow in those days of sailing ships, and before he reached New York, he had worked out the first rough drawings of the instrument which was the forerunner of those now used in most of the countries of the world. He was poor and had to do without many things so that he might use the money for

experiments. But he persevered, and by 1836 he had succeeded in making an instrument that would work. Next year he produced a better instrument, and showed it to some friends. This was patented the same year—1837—but it was a long time before Congress would give any help toward building a telegraph line. This they did in 1843. The first telegraph line was built in 1844 from Washington to Baltimore, and Morse sent over it the message "What hath God wrought?"

About ten years afterward a man named Jackson claimed that he was the original inventor of the telegraph. He went to law to prove it, but Morse was able to bring evidence to show that he was the real inventor, and that there was no truth in Jackson's statement.

Morse lived until 1872, and saw the wonderful transformation in the business of the world with which his invention had so much to do. The telegraph was quickly adopted by most of the European countries, and though they paid its inventor nothing at the time, they afterward combined to present him with a large sum.

And now we shall go back to think about another American, who was among those who helped to make the Morse telegraph possible. You remember that we read on page 2169 how William Sturgeon made the first electro-magnet. This was improved upon by Joseph Henry, who insulated the copper wire of the magnet by covering it with silk thread. Instead of using one wire coiled round the magnet, as Sturgeon did, he made a close covering for the soft iron core by winding round it several of his silk-covered wires.

JOSEPH HENRY AND THE ELECTRO-MAGNET

Joseph Henry was born in Albany, 1797, and attended the Academy there. As he meant to be a doctor, he commenced to study chemistry, and from that his interest in electricity began. In 1826, he was made professor of mathematics in his old school, and shortly after began his experiments with the electro-magnet. He made many experiments in electricity which all helped toward gaining knowledge of this wonderful subject.

He was one of the first of the noted scientists in the United States, and was for many years secretary of the Smithsonian Institute, and President of the National Academy of Sciences in Washington. He lived in Washington during the later years of his life, and died there in 1878.

In 1838, a German named Steinheil discovered that the earth itself would carry back the electric current to its starting-place, and that it is only necessary to bury the wires in the earth, or "ground" them, in order to complete the circuit. Many discoveries and improvements have been made since then by Stearns, Edison, and others, and it is now possible to send eight messages —four each way—over one telegraph wire at the same time. Many improvements have been made in the instruments also, and speed has been raised to almost lightning rapidity. All these improvements, however, are so technical that we have not space to consider them here, and must go on to think of the makers of the submarine telegraph.

Of all the men, and they were many, whose work made the submarine telegraph possible, the greatest was Sir William Thomson, whom we know better as Lord Kelvin. He was born in Belfast in 1824, the son of a professor of mathematics, and, when only eleven years of age, was received as a student at Glasgow University. He afterwards studied at Cambridge University and at Paris, and was a professor in Glasgow University before he was twenty-three. All his life he worked out problems of the most difficult character, as to the strength, action, and effects of electric currents under all sorts of conditions.

LORD KELVIN'S GREAT WORK FOR SUBMARINE AND WIRELESS TELEGRAPHY

To most people it would have seemed dry, unproductive work, but his splendid mind was able to apply to practical uses the discoveries resulting from his delicate experiments and profound calculations. One result was this, that we have those wonderful cables running under the sea to all parts of the world, as we read on page 2496. Bright and Field had the task of laying the cable, but it was the great brain of Kelvin which thought out the instruments which made it possible to record and read the messages. This is only a fragment of what Lord Kelvin did for telegraphy. Some of the most delicate and beautiful portions of his work are employed for the receiving and

recording of wireless messages. It will be sufficient, however, for us to remember that, as we grow older, we shall more and more trace the labors of Lord Kelvin, and understand the value of his work for the science of electricity in general, and of telegraphy in particular. Lord Kelvin died on December 17, 1907.

Many improvements have been made in the instruments used in ocean telegraphy, and one of the most important was made quite recently by an American army officer, George Owen Squier. By the old method, messages are recorded by a wavy line, which is difficult to read, and cannot be sent quickly. By using the Squier improvement messages can be recorded by a series of dots, and this enables many more messages to be sent within the same period of time.

So far we have considered only the telegraph, but to most of us the telephone is a still more wonderful and beautiful instrument. By its help we can talk to friends who are hundreds of miles away. We can take up the telephone receiver in San Francisco, and converse with some one in New York as clearly and easily as if they were in the next room.



The heliograph is a sort of natural telegraph. Messages are heliographed by the flashing of the sun's rays from a small mirror. The Morse alphabet is used, and the flashes are long and short to represent dashes and dots.

This photograph is by Messrs. Gale & Polden.

THE EXPERIMENTS THAT LED TO THE FIRST TELEPHONE

The principle of the telephone is explained on page 335 so that we need not touch upon it again. It is such a marvelous instrument that it seems extraordinary that the idea of it should have occurred to several minds.

But several men did think of it. They thought of it long ago, when, in 1667, Robert Hooke made sound travel, not by electricity, but along a stretched-out wire. They thought of it again when Wheatstone made the sound of a musical box travel along a deal rod from a cellar up into a hall where a large audience was listening. But in 1837, the year that the telegraph was patented in England and America, Dr. C. G. Page, an American, published an essay on the music produced by an electro-magnet at the instant when the circuit is closed. That was the beginning of the idea to make electricity carry the voice.

Six years passed, and then a clever man named Johann Philip Reis took up the theory, and, working steadily on until 1861, actually produced an electric telephone which carried music and vocal sounds, but not speech. The principle was much the same as that now employed, but he had not reached perfection.

The world waited until 1876; then a strange thing happened. Two men, both of whom had been working on the idea of a telephone, appeared at the Patent Office on the same day, and within a few hours of each other. One of them was Elisha Gray, the other Alexander Graham Bell.

TWO MEN WORKED TO INVENT THE TELEPHONE

Elisha Gray was an inventor who lived at Barnesville, Ohio, where he was born in 1835. He had already taken out a patent for a device for a telegraphic apparatus when on February 14, 1876, he filed a notice of his plans for a telephone instrument.

He lived until 1901 and made many inventions for the improvement of telegraph and telephone instruments. But he never worked out the ideas set out in the notice filed in 1876, for although he did not then know it, the telephone had already been invented.

Two hours before Gray's notice was filed, Alexander Graham Bell had appeared at the same office, and made an application for a patent for an actual working telephone, and with his application presented working plans from which his instrument could be made. The patent was granted and six months afterward he built the first real telephone line at his father's home at the city of Brantford in Canada.

It was a most extraordinary thing that these two men, unknown to each other, should be working at the same time on the same problem, and on the same day should appear at the Patent Office in Washington.

Alexander Graham Bell was born in Edinburgh, Scotland, in 1847. He commenced his education in Edinburgh, and afterwards went to the University of London, where his father was a lecturer. In 1870 he came out to Canada, where he lived for two years, and then removed to Boston, where he taught in the Boston University. Alexander Melville Bell, his father, had always been much interested in the hard lot of the deaf and dumb. He had worked out a method of teaching them to speak, and while he lived in Canada young Alexander Graham Bell devoted himself to teaching this method in an institution for the education of these sadly afflicted people. He has always kept his interest in the subject of the education of deaf people, and has used a large sum of money for this purpose.

After he went to Boston, he began to study sound waves, and to experiment with what he called a "harmonic telegraph." But all the while that he was at work on this instrument, he was haunted by the belief that an instrument could be made by means of which the sounds of the human voice could be carried over the wire. Telegraph messages were transmitted by sound. Why, he thought, could not the varying sounds of speech be transmitted in something the same way? Curiously enough he carried on most of his experiments at Salem, near Boston, where, about forty years before, Doctor Page had made the discovery that gave the first hint of the possibility of using electricity to convey the sounds of speech.

One day, while Alexander Bell was working at his telegraph instrument, something happened that caused a sound to travel from the transmitter to the receiver, at which he was listening. That was enough to convince him that he was right in his belief that he could invent an instrument through which the voice could be sent and received. Dropping forever his work on his "harmonic telegraph," he patiently set himself at the task of unraveling the mystery of the sound that he had heard. For months he could think of nothing else, and the result was the instrument which has almost revolutionized the business of the world.

He has made many other inventions, and one of these, the telephone probe, has proved to be of great service to mankind. This valuable instrument enables surgeons to find out where a bullet or fragment of metal has lodged in a man's body, without putting him to the added pain of probing the wound, and has been the means of saving much pain, if not many lives.

THE MAN WHO MADE LONG DISTANCE TELEPHONING POSSIBLE

When the telephone was first put into use, no one dreamed that, within the lifetime of its first inventor, a man could speak across the continent from the Atlantic to the Pacific, or could speak in Washington and, by means of the telephone instrument and wireless system, be heard in Paris. That is a wonder at which we never cease to marvel. Perhaps if we realized the amount of deep learning, profound thought, and careful, patient work that have gone to bring this about, we would marvel still more. Men of many nations worked on problems which had to be solved, and many inventions were made, before the great result could be achieved.

As telephone instruments were made more perfect, it was found that they could be used to speak over much greater distances than had at first been thought possible. Still, when the wires were carried beyond a certain point, the sound became very indistinct.

After all the mechanical difficulties had been overcome, it was found that a scientific problem which no one had solved stood in the way of using the telephone over long distances. For a little while this prevented any progress being made. Before long, however, the obstacle was overcome by Professor Pupin of Columbia University, who solved the problem and invented a device to overcome the obstacle which it set up.

The honor due for this advance belongs partly to America and partly to little Serbia, for although Michael Idvorsky Pupin was born in Hungary in 1858, his parents belonged to the Serbian nation. He first went to school in his native town, but while he was still very young he was sent to a better school at Prague in Bohemia. At the age of six-

teen he came to the United States and nine years afterward he graduated from Columbia University. Later on he studied at Cambridge University in England and at the University of Berlin. When he finished his studies abroad he came back to America, and has since been engaged in teaching science at Columbia University, in deep study of electricity and in writing.

GUGLIELMO MARCONI, THE GREAT INVENTOR OF WIRELESS TELEGRAPHY

In another place in the book, we have read of the discovery of the Hertz or electric waves; now we come to the story of Guglielmo Marconi, the man who learned how to use these waves to send messages round the earth in a moment of time.

Guglielmo Marconi, an Italian whose mother was an Irish woman, was born in Bologna in the year 1874. From childhood he was intensely interested in electricity, and made it his chief subject of study at Bologna University. When he first read of the Hertzian waves, he saw in a flash that they could be used to send messages without the aid of wires. He was astonished that no one had yet discovered how this could be done, and before long he began to make experiments, in the garden of his home, with the aid of poles and of simple instruments that he made himself. Very soon, to his unbounded delight, he was able to send messages across the garden. Then he went to the country to experiment over longer distances, and when he succeeded in sending messages a distance of two miles, he offered his discovery to the Italian government. The government did not accept his offer, so Marconi wrote to Sir William Preece, the chief of the British Postal Telegraph Service, who invited him to London. He accepted the invitation, and you can judge of Sir William's astonishment when a slim youth of twenty was announced in his office as the scientist Marconi with whom he had been in correspondence.

In England, Marconi went on with his experiments with great success. The English government took the matter up and his instruments were installed on a lightship stationed on the Goodwin Sands. A wireless service was established between England and France. Some of the large liners were equipped with Marconi's instruments, a station was built at Poldhu in Cornwall, and messages flew to and fro between the land and outgoing and incoming ships.

THE SECRET OF MARCONI'S KITE-FLYING

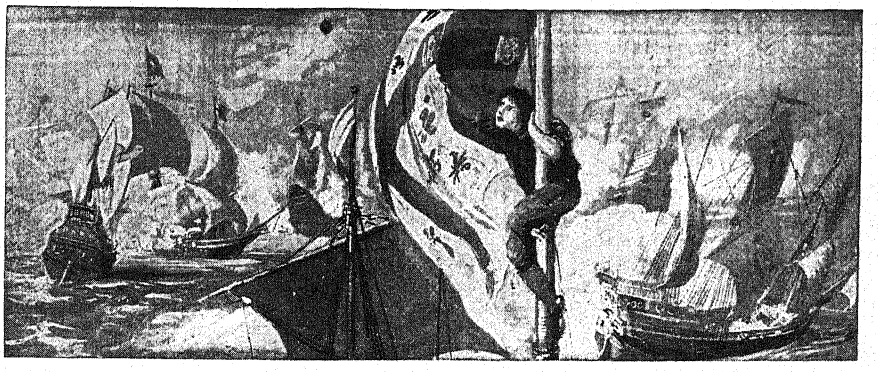
Then Marconi went to Newfoundland to fly kites. Now we have all tried to fly kites, and perhaps you will say, what a funny thing to do! But Marconi's kite-flying was done with a purpose. He wanted to prove that messages could be sent across the Atlantic, and he did it. He fastened a receiving instrument to a huge kite. To fly his kite, he used wire, fastened securely and attached to an instrument which had a telephone receiver, and by this means he was able, on the cliffs of Newfoundland, to catch a message sent to him from Poldhu. That was at the end of 1901, and since then so many wonders have been worked by the wireless telegraph that we have almost ceased to marvel.

In 1915 wireless messages were sent from the eastern to the western coast of this continent and to Hawaii. In 1916 they were sent from Arlington to Japan, and between Mexico and Germany, and, greatest wonder of all, the sound of the human voice has been carried from Arlington to Hawaii, and from Arlington to Paris, without the aid of wires.

Many men have helped in the development of the wireless telegraph. Sir Oliver Lodge, Sir William Preece, Lee de Forest, R. A. Fessenden, Valdemar Poulsen, Michael Idvorsky Pupin, Ferdinand Braun and Max Wien are only a few of the men who have done great work in this field. But to Marconi alone belongs the honor of seeing the one way in which messages could be sent without the use of wires. All the others have followed in the pathway that he showed.

Like Alexander Bell, he has lived to see the greatness of his work appreciated by the world. Many honors have been given to him, but probably nothing has ever brought him greater triumph than he felt when he heard the first faint signal caught and recorded by his first little instrument, and knew that he, a boy of nineteen, had mastered one of the greatest powers of nature. He has had much happiness in his life, but nothing can have given him purer joy than the knowledge that his discovery has been the means of saving thousands of human lives.

THE NEXT STORY OF MEN AND WOMEN IS ON PAGE 4549.



THE BRAVE APPRENTICE

CONTINUED FROM 4357

THAT some of the greatest men have risen from the humblest circumstances is true in almost every walk of life, and certainly the Navy is no exception. Somewhere about the year 1680, a small boy sat working upon a tailor's bench at Bonchurch, in the Isle of Wight. His master being out of the way for the time, the boy had dropped his needle and was gazing out to sea, wishing he was anywhere but in that shop. He was a pauper orphan, and had been apprenticed by the parish authorities to a tailor.

As he was dreamily gazing out to sea, a squadron of British warships came into sight round a bend of the coast, and, without a moment's hesitation, the boy threw down his work, and, running out of the shop, rushed to the beach, where he jumped into a boat, and rowed as hard as he could to the admiral's ship.

The conditions of life on the warships were then very hard indeed, and recruits were wanted badly, for men were not anxious to join the Navy; so when the little lad offered his services they were readily accepted.

It was not long before he saw active service, for on the very next morning the British ships fell in with a French squadron, and fighting began at once. The boy did his duty well, running hither and thither, as he was bidden, and taking a keen interest in the exciting events around him. At last, when the fighting had been going on for some time, and there seemed no sign of a definite result, the boy asked a sailor: "How shall we know when the enemy has given in to us?"

"Oh," replied the man, pointing to the flag flying at the masthead of the French admiral's ship, "as soon as that flag is hauled down the enemy will have given in, and victory will be ours."

"Is that all?" said the boy, and hurried away.

In those days vessels did not fight as they do now, with miles of sea between them, and sometimes out of sight of one another. They ran up side by side, and the crew of each tried to board the other. The tailor's boy sprang upon the deck of the French admiral's ship, which was alongside his own, and, unnoticed in the excitement, nimbly climbed up a rope-ladder, and eagerly seized the French admiral's flag. Then, wrapping it round his body, he descended with it to the deck, still unperceived by either the French or the English sailors.

No one had seen his daring action, but presently the English sailors noticed that the French flag was gone, and, supposing that the enemy had given in, they rushed upon the deck of the French ship with such impetuosity that the enemy was filled

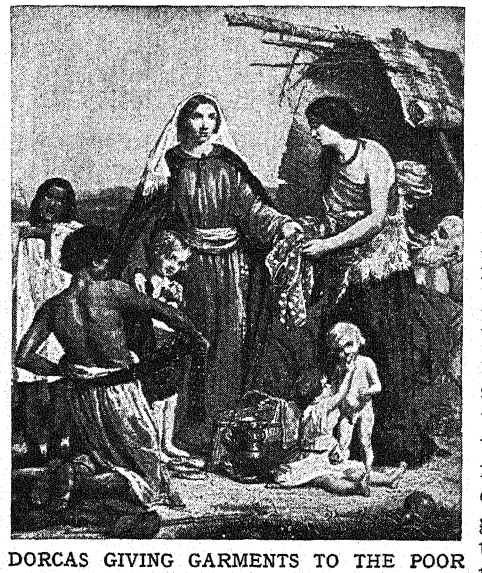
with consternation and dismay. The French gunners fled from their guns, and within a moment or two the ship was actually in the possession of the English. Just as victory was assured, the apprentice sprang forward, and showed the captured flag to his comrades, who received it with the greatest astonishment.

The news soon spread, and the boy was led with his prize into the presence of the admiral, who praised his bravery and enterprize, and promoted him to the rank of midshipman on the spot. That a lad who could do such an action as this should rise to distinction in the Navy is not surprising. The young midshipman was promoted again and again, until he reached almost the highest rank in the British Navy, and became known in history as Admiral Hopson.

THE WOMAN WHO CLOTHED THE POOR

IT is not only great and heroic acts, which appeal to the imagination, that can be described as golden deeds. Many a quiet deed of kindness or a work of mercy done away from the public gaze, and with no thought of praise or reward, has had far-reaching effects for good, and encouraged others to emulate the worthy example set them.

A striking example of this is the case of Dorcas, or Tabitha, the Christian disciple of the early Church, whose death in the midst of works of charity and helpfulness caused great distress among the poor widows of the town of Joppa, on the coast of Palestine.



DORCAS GIVING GARMENTS TO THE POOR

We do not know when Dorcas first became a convert to Christianity, but she soon learned the true spirit of the Master, as her kindly thought for the poor proves. She is described to us by St. Luke as " full of good works and alms-deeds which she did," so that not only had she physical beauty, as the meaning of her name suggests, but she was beautiful in character and in soul.

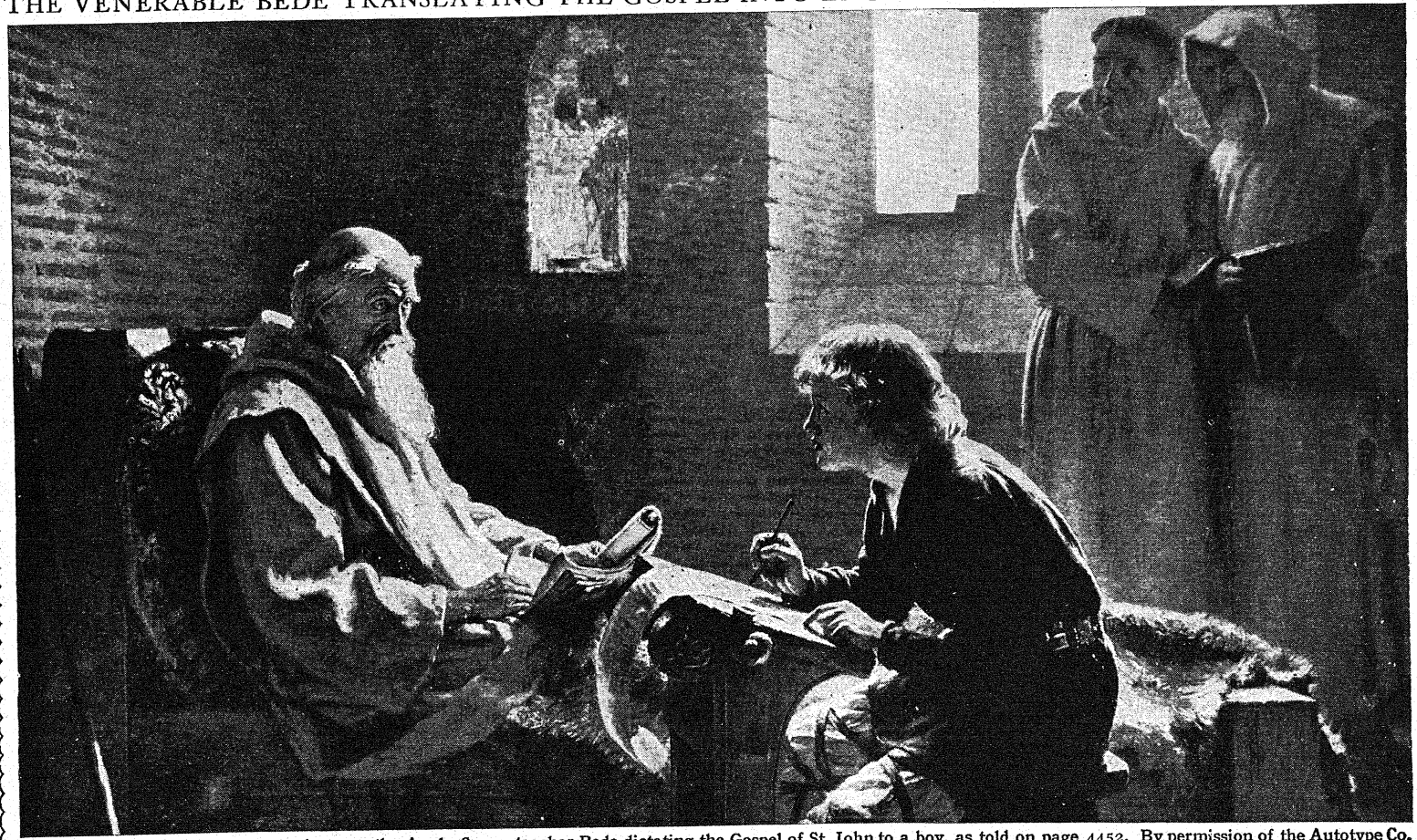
Then, as now, the poor women of cities and towns found it difficult to obtain proper clothing for themselves and their children, and it was in order to meet this need that Dorcas gave of her time and means.

She did not simply distribute so much money, and think that thereby her duty to the poor was fulfilled, but she worked with her own hands and made garments of various kinds—coats and cloaks—which she distributed freely among the poor and needy women and children of her town. The gratitude which the people felt for her on account of her loving service is shown by the fact that at her death they all came together to mourn her loss, and to pay the last tribute to her memory. Had there been no other result from her life and loving work than the good that came to the poor of Joppa, the name of Tabitha, or Dorcas, would have deserved to live and be handed down, as it has been. But the result was far more lasting, and is seen right down the ages since those times of the early Church to the present day, and never did the bright example of Dorcas give greater inspiration than it is giving to-day to thousands of willing helpers who are trying to bring cheer to the poor.

There are few Christian churches to be found in this country, at any rate, without their Dorcas society, the aim and object of which is to do the very same work as Tabitha did nearly nineteen centuries ago.

It would be impossible to say how many of the naked have been clothed in all the ages, and how much joy and happiness have been brought to the poor, solely as a result of the example first set by Dorcas in the town of Joppa. Such acts as she performed are, we must all agree, golden deeds in the very highest and truest sense of the term.

THE VENERABLE BEDE TRANSLATING THE GOSPEL INTO ENGLISH IN THE LAST HOURS OF HIS LIFE



This picture, by J. Doyle Penrose, shows us the Anglo-Saxon teacher Bede dictating the Gospel of St. John to a boy, as told on page 4452. By permission of the Autotype Co.

THE WONDERFUL STORY OF THE VENERABLE BEDE

THE life of Bede was a beautiful one, spent far from the din of the battle-field, the bargaining of the market, and the pleasures of the court.

All his days were passed, though he was the greatest scholar and teacher of Anglo-Saxon times, in the peaceful monasteries at Wearmouth and at Jarrow. There he studied, wrote, and taught the six hundred youths who gathered round him. For them he wrote text-books covering the then known field of knowledge; for them, and for the people, he wrote a history of the English Church, telling how Christianity was brought into the country.

So earnest and noble-minded a scholar could not bear to think that the greatest book ever written should remain a sealed book to every person unable to read Latin; and he was determined, if God gave him strength to do it, to translate at least the Gospel of St. John into Anglo-Saxon, that all might hear and understand it in their own tongue. Forty-four works, mostly in Latin, he had written during his busy life of teaching; one more—the Gospel of Love—he would leave behind him. He was getting ill and feeble, but he would not leave even to the ablest pupil a work so important as the translation of the Gospel. "I will not have my boys read a lie," he declared, "nor labor fruitlessly after my death."

Day by day Bede grew weaker; but, refusing to rest, he continued cheerfully dictating to his scribe. One of his scholars, Cuthbert, wrote a description of the last hours of his revered master, and an artist has painted a beautiful picture, given on page 4451, of the old man on his couch in his little cell, with a youth before him eagerly taking down his words.

In his History of the English People, the historian Green thus describes the scene:

> The dawn broke on another sleepless night, and again the old man called his scholars round him and bade them write.
>
> "There is still a chapter wanting," said the scribe as the morning drew on, "and it is hard for thee to question thyself any longer."
>
> "It is easily done," said Bede. "Take thy pen, and write quickly."
>
> Amid tears and farewells the day wore on to eventide.
>
> "There is yet one sentence unwritten, dear master," said the boy.
>
> "Write it quickly," said the dying man.
>
> "It's finished now," said the little scribe at last.
>
> "You speak truth," said the master. "All is finished now."

Placed upon the pavement, his head supported in his scholar's arms, his face turned to the spot where he was wont to pray, Bede chanted the solemn "Glory to God." As his voice reached the close he passed quietly away.

THE LITTLE GIRL TRUSTED WITH STATE SECRETS

WE look on Oliver Cromwell as a stern character, harsh to his opponents, and forbidding in his ways. Yet he could be very gentle to a little child; and for his little granddaughter he kept a warm place in his heart. He liked to have the little girl often before him; and when she was only six years old would keep her by his knee as he sat at a Cabinet Council discussing affairs of State. Some of his Ministers thought it unsafe to have even such a little girl listening while they talked about important matters concerning the country, and they let Cromwell know their fears.

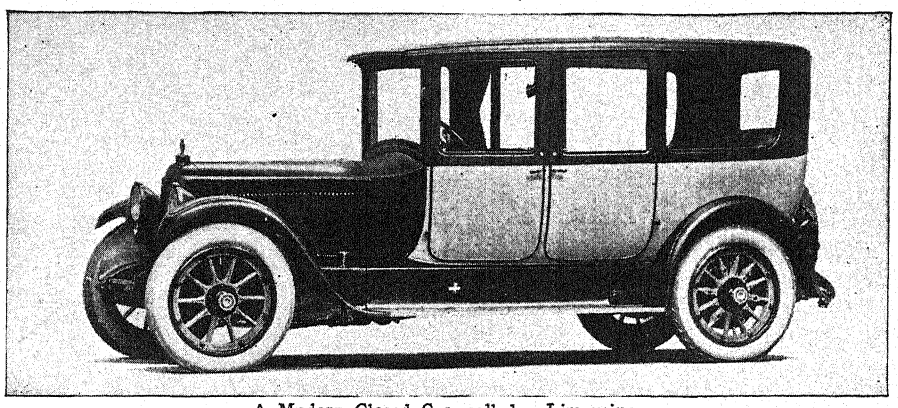
"Why, there is no secret I would trust with any of you that I could not trust with that infant," was the reply.

Determining to prove to his Ministers that his trust in his little granddaughter was well merited, Cromwell one day whispered to her something in confidence, saying it was a secret, and she must not tell it. He then set her grandmother and mother to try to get the secret from her.

But no threats or bribes, nor even whipping, could make the little girl disloyal to the trust the grandfather put in his Puritan grandchild. At last they gave up the attempt to get the secret from her, unable to resist longer the plea that her grandfather had trusted her with a secret and she must keep it, though she did not wish to disobey her mother.

And so Cromwell's Ministers had no more fear that State secrets would be told when the loyal little girl knew them.

THE NEXT GOLDEN DEEDS BEGIN ON PAGE 4577.



A Modern Closed Car, called a Limousine.

HOW MOTOR CARS ARE MADE

CONTINUED FROM 4269

THE title of this story is really too large, for we cannot tell you how motor cars are made in one story, or in a dozen, for that matter. The motor car as we see it in the streets is made up of thousands of parts, made from many different materials. It is manufactured in great shops with the aid of much complicated machinery. We shall try, however, to give you an idea of the way a car is put together.

A motor car is simply a car that moves of itself. A locomotive is a motor car, and so is a steam roller. We now mean by the words, however, a car that travels on an ordinary road, and carries passengers, or freight. In fact we usually mean a passenger car, and call the freight car a motor truck. Most of them are run by gasoline engines, though there are many electric cars, and a few steam cars.

MOTOR CARS NEEDED THE PROPER ENGINE

The idea is not new. Over two hundred years ago, Sir Isaac Newton thought of the idea, and in 1770 a Frenchman built two steam cars which ran. Other men built cars in England, and we show you a picture of one of them on page 6050. All of them were very heavy and very clumsy, and soon went out of use. For a long time men had to depend upon the horse to carry them about.

Not until the internal-combustion engine was invented did men again try to make a motor car. You know the difference between an engine of this kind and a steam engine. In the second, heat is applied on the outside of the boiler to make steam, which pushes out the pistons of the engine. In the other, gas is admitted to the cylinders and set on fire. The explosion drives out the pistons. On pages 1788 and 1789 you will find a splendid diagram which shows you how an engine of this kind works.

This engine was not perfect at first. It had only one cylinder, and often got out of order, but men worked on it for years, and many improvements were made. When this engine began to work well, the motor car as we know it became possible. No one man can be given the credit for the engine. It is not even certain who first thought of the idea, but our motor cars, motor boats and aeroplanes all depend upon it. Really reliable cars were not made until after 1900.

In making the first motor cars men tried to make them as much like vehicles drawn by horses as possible. On another page we show you a picture of a car made in 1899. Later, when better roads were made, so that the body could hang lower, the wheels were made smaller, and they were

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fitted with pneumatic tires which made riding much easier. Many inventions have gone into the car until now it seems as if there is little more to be done.

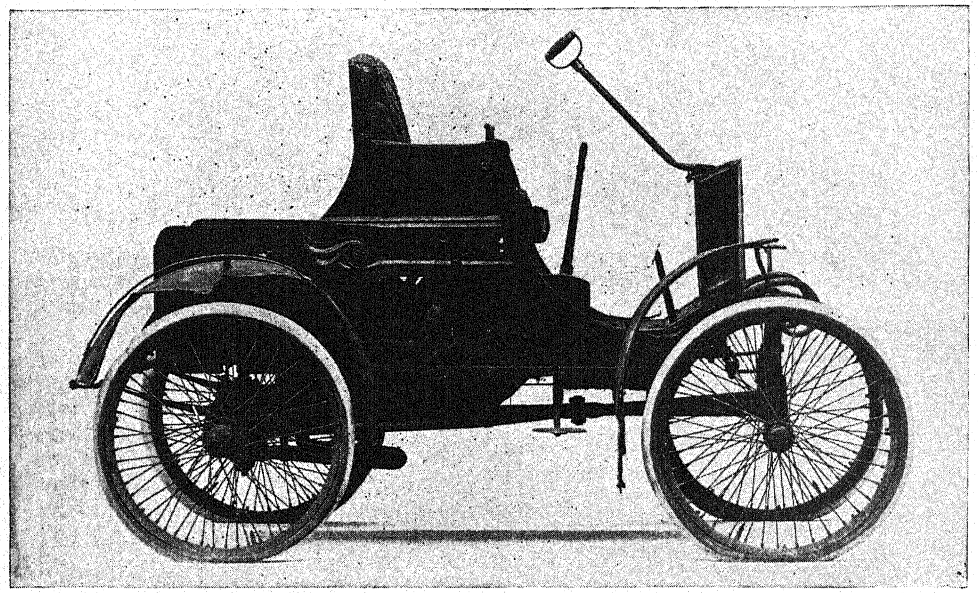
INSIDE A GREAT FACTORY WHICH MAKES CARS

In a great factory there will be several departments. Some manufacturers buy their metal parts already cast, but others melt their own iron, steel and brass, and cast the parts they need. This operation is very interesting, and is about the same, no matter what the metal. Boxes without top or bottom are prepared. One is filled nearly full of a particular kind of sand which is kept just a little moist. Then a pattern, generally made of wood, though sometimes of metal, is laid on it. Another box is placed above the other and sand is filled in around the pattern and packed closely. Then the upper box with its sand may be lifted off, even though it has no bottom. The pattern is then taken out of the lower box. The upper box is then replaced above the other. The sand holds its shape, and inside the boxes is a hollow the exact size and shape of the pattern. The molten metal is then poured through a hole left for the purpose and fills up the mold. When the metal has cooled, the sand is taken away, and the part is taken out.

Some of the castings go to great ovens where they bake for hours. This makes them stronger or tougher. Some go to machines which pound them, and shape them; some go to be polished, or to be joined to still other parts. There are thousands of separate parts in a motor car and one cannot keep up with them all.

More motor cars are manufactured in the United States than anywhere else and the largest single factories are here. They make cars of different prices, from a few hundred to as many thousand dollars. All, whether they make cheap or expensive cars, use much machinery. In the shops there are machines larger than an ordinary room. Some stamp out great pieces of metal as if they were so much cheese. Lathes cut off shavings of steel as if they were soft wood. Some machines grind pieces that were purposely made a little too large until they are the proper size. Some of these parts must be accurate to a thousandth of an inch. Some machines drill holes into steel, a dozen, or twenty at a time, all exactly the right distance apart. It would be almost if not quite impossible to drill them so accurately by hand. Others cut cogs into wheels so that they fit exactly. There are thousands of machines in the different rooms, and they work with wonderful precision.

In the woodworking rooms, saws, planers and shapers are buzzing. Spokes and rims for wheels are being made. Holes are being bored or cut, and one part fits



The first Packard car was made in 1899. Notice how clumsy it seems to us now, and how uncomfortable it must have been. Compare it with the picture on the preceding page, which represents a recent model.

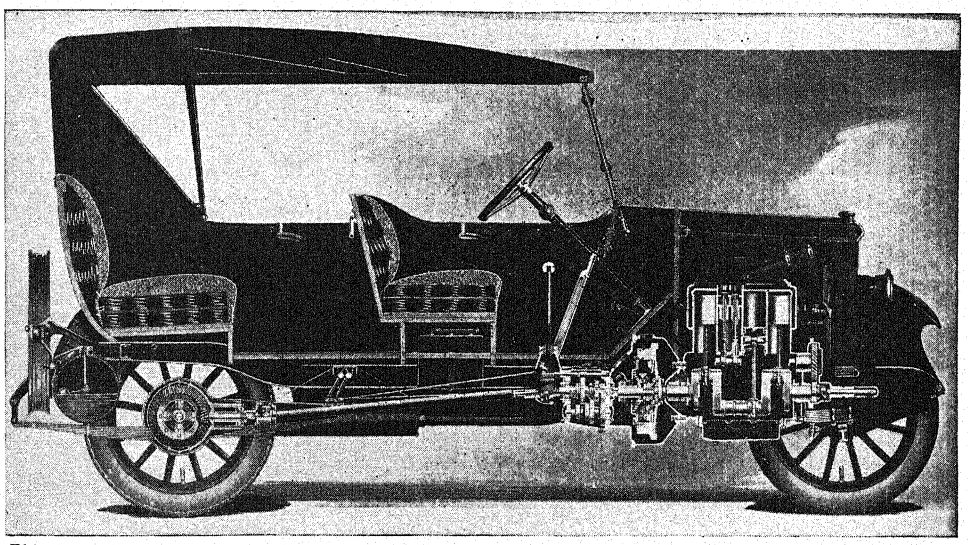
into another without a hitch. The wooden parts of the body are being put together before your eyes. There are great paint rooms where wood and steel are being covered. Much of the painting is done by a spray, but for some parts work with a brush is necessary. There are upholstering rooms where the cushions for the seats and backs are being fastened on.

So far you have not seen anything which looks much like a motor car. You have seen thousands of pieces of iron, steel, brass, bronze, nickel, wood, rubber and leather, some large, some small, which you are told are required to make a car, but that is all. How they can ever be put together you cannot understand. Let us go to one of the assembling rooms and see what we can see there. This is a room where parts are assembled or put together. We wander into the room where engines are being assembled. We find here something like an engine on a moving truck raised conveniently above the floor. Part after part is added until the complicated machine, built as delicately as a watch, is completed. We are told that each is taken to another room, tested in every possible way, and then made to run for hours.

Let us now go to another room, and see how the car itself comes together. Men take the two long side bars, and quickly fasten the cross pieces which hold them together. The bare frame is placed in a truck which is drawn slowly and steadily along by a chain or belt. As it passes gangs of men attach the metal parts—springs, brackets to support the running boards, a muffler, the axles, and dozens of other things. A spray of naphtha cleans off all oil or dirt, and paint is sprayed on. The frame disappears into a drying room. When it appears on the other side, it gets a coat of varnish, goes through another hot room, and is then left to cool.

It resumes its journey. The engine is swung down from a loft, up from below, or comes along another track, and is fastened firmly to the frame, which we now call a chassis. The truck continues to move. To one side is a large stock room where thousands of parts are piled up in convenient reach. Each man or set of men attaches something as the car moves along. The body swings down from above. The wheels, tires, lamps, the clock suddenly appear. Perhaps a man rides on the car, working all the time until his job is done. Then he drops off and goes back to the place where he started, to begin again.

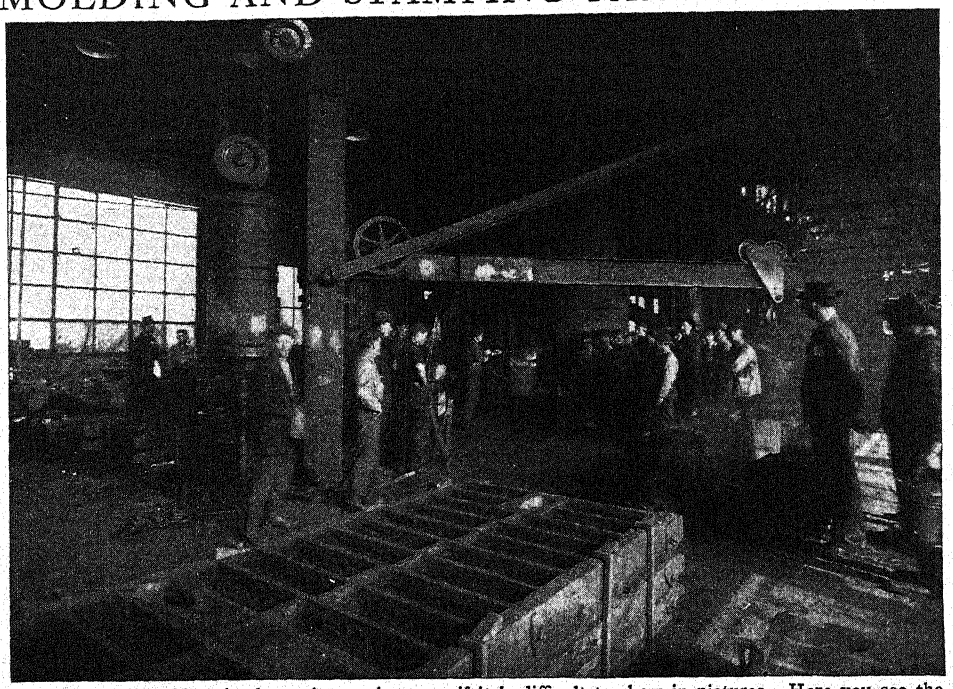
The car has finally traveled a long distance, perhaps a mile or even more. Every few yards an inspector has tested some part. It now comes to the end and is rolled off on the floor. Fill the tank with gasoline, and it is ready for the road.



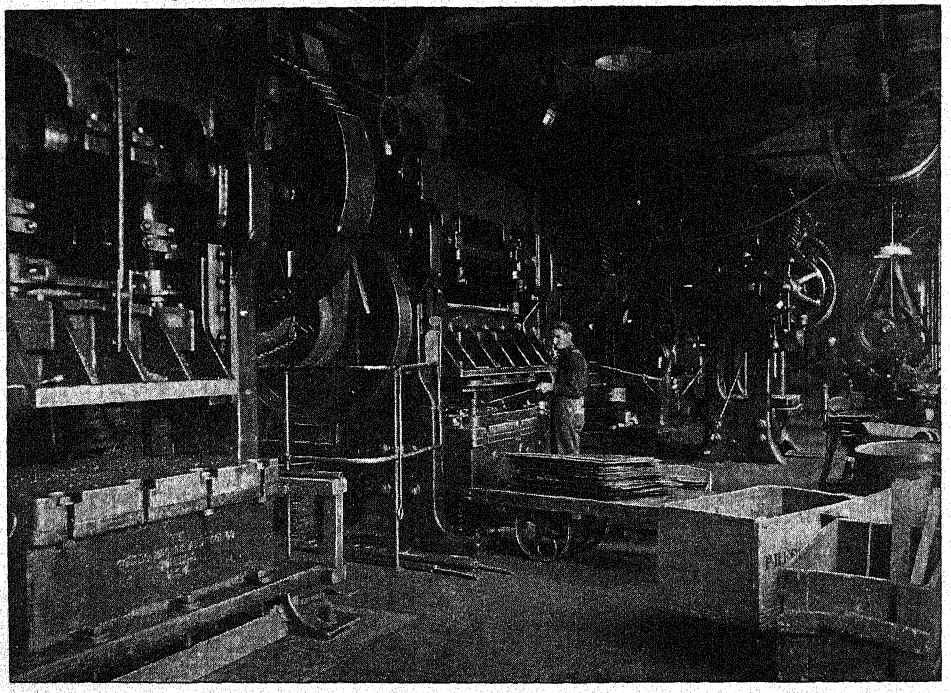
This is an interesting picture-diagram of an Allen car cut through the middle. If you will turn to page 1788, where a diagram of an engine is shown, you will understand how it works. The gear box is shown cut open, and you will also be able to puzzle out how the car can go at such different speeds.

THE NEXT STORY OF FAMILIAR THINGS IS ON PAGE 4539.

MOLDING AND STAMPING PARTS FOR CARS



The process of molding is always interesting even if it is difficult to show in pictures. Here you see the men about to tap the cupola to let the melted iron run out into the large iron vessel. The iron will be poured into these boxes of sand you see here. As explained in the text, each contains an open space the exact size and shape of some part of a car, which is filled by the molten metal from the great ladle.



These enormous machines shape pieces of sheet metal for bodies as if they were paper. When the enormous jaws above come down they can bite the sheets of metal in two, or bend them to any shape desired. They exert so much force that they would flatten your watch or your ring as thin as a piece of paper.

Pictures on pages 4456, 4458, and the lower half of 4459 by courtesy of the Cadillac Motor Car Company.

THE WORK OF THE MULTIPLE DRILL



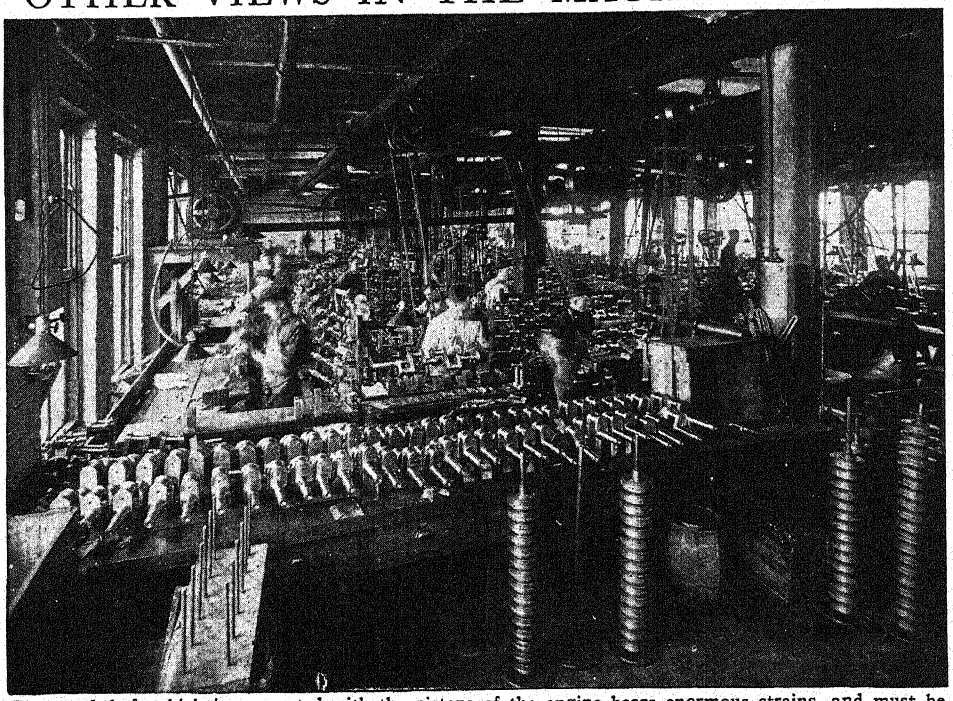
This drill can be set to bore any number of holes in a piece of iron or steel. The part of the car in which the holes are to be made is placed on the traveling carriage and at the pleasure of the operator the drills descend and bore the holes in an instant. Drilling the holes by hand would take a long time and they would not be so accurately spaced.



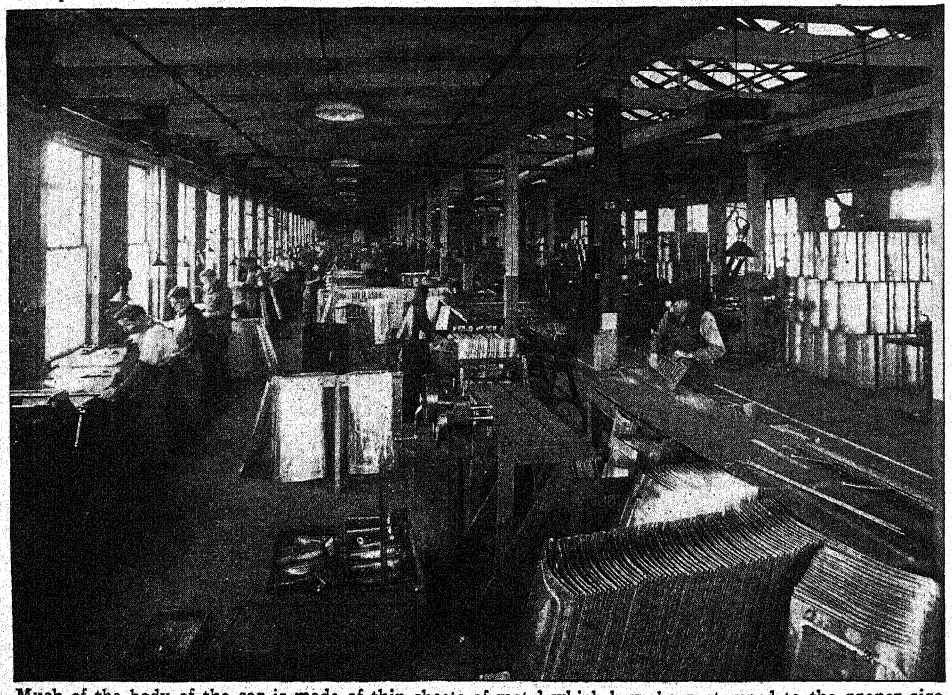
Here you see a section of a workshop engaged in producing rear axles. On the left bolts are being placed in holes which have been drilled by the machines above, and on the right men are at work on the same part.

The pictures on pages 4453, 4454, 4457, 4460, 4461 and at the top of 4459 by courtesy of the Packard Motor Car Company.

OTHER VIEWS IN THE MACHINE SHOPS

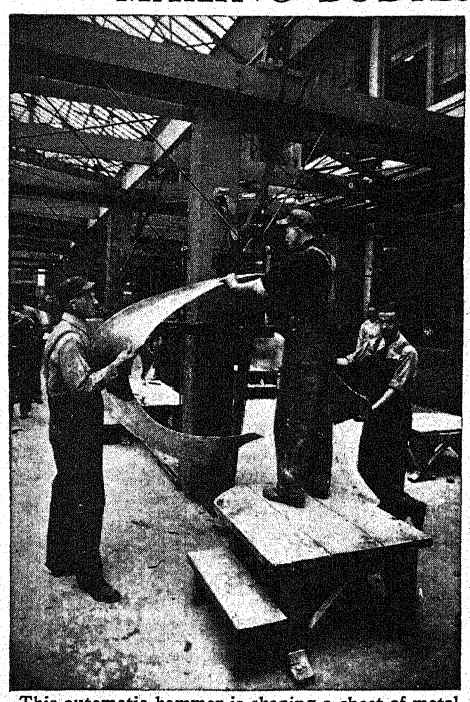


The crankshaft which is connected with the pistons of the engine bears enormous strains, and must be perfect. Here you see on the left shafts receiving the final polish and in the centre the inspector is measuring them to see whether they are the proper size. He must take about twenty-five measurements, and at some places the shaft must be accurate to the thousandth of an inch. This paper is three times that.

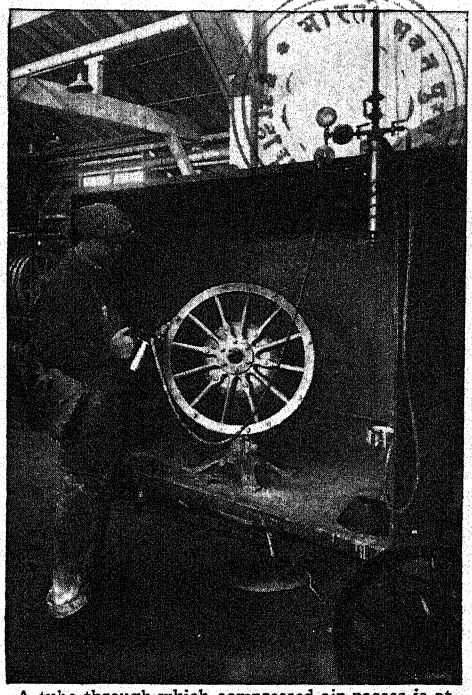


Much of the body of the car is made of thin sheets of metal which have been stamped to the proper size and shape by the great machines shown on another page. Here you see the workmen putting the final touches on many different parts. Perhaps you can recognize where some of them belong in a completed car. Some are brass, some steel, and some, perhaps, are aluminum. Some of the parts are nickel-plated.

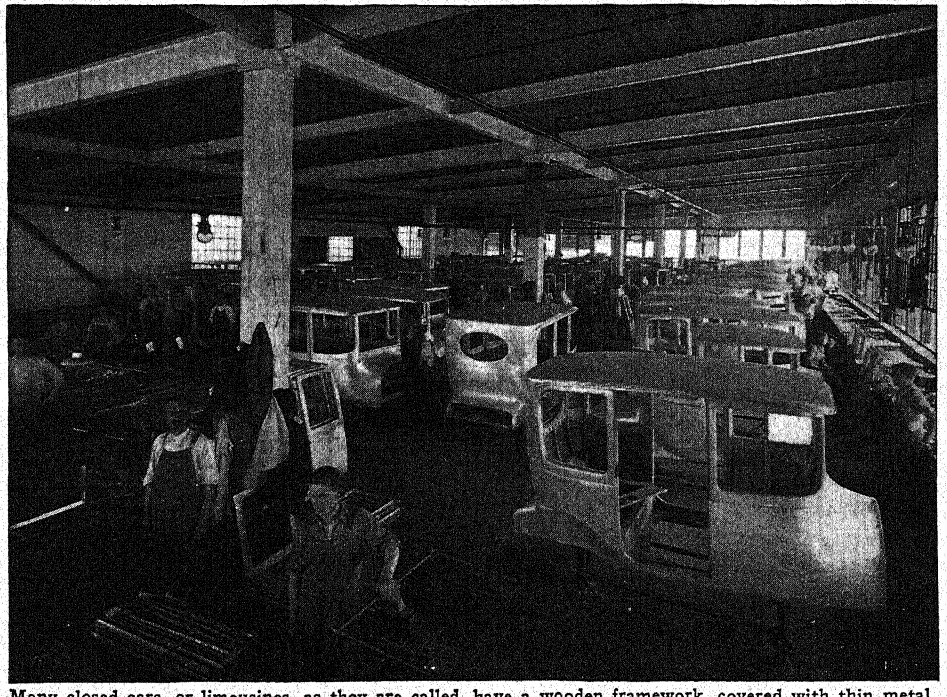
MAKING BODIES FOR THE CARS



This automatic hammer is shaping a sheet of metal into a sweeping curve for the body of a car. The stamping machines cannot do quite this much, but the hammer does it rapidly, as it rises and falls.

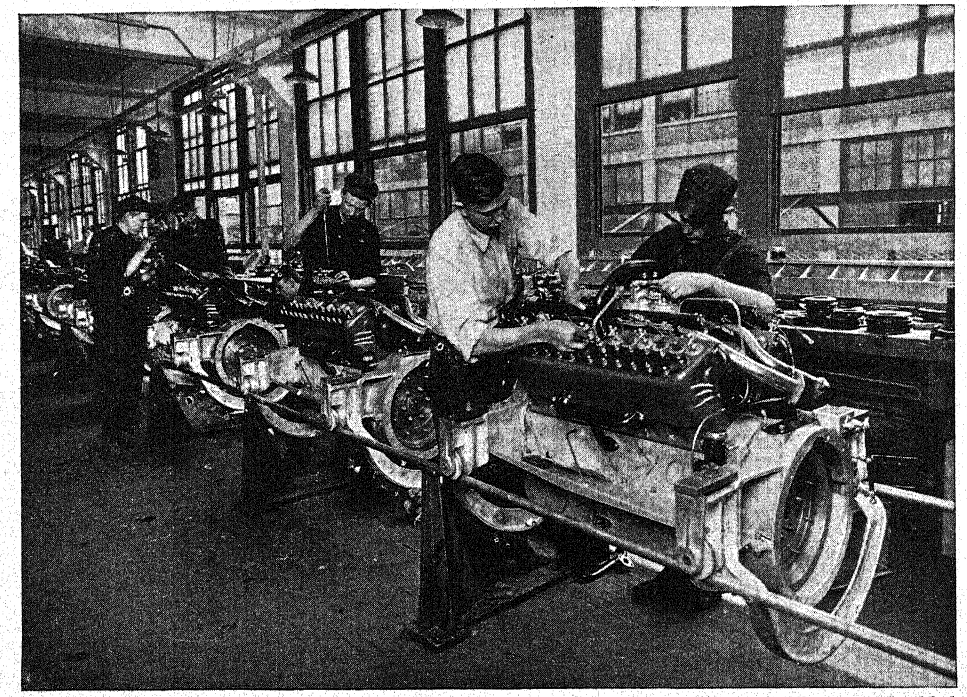


A tube through which compressed air passes is attached to the can of paint the workman holds. The paint is sprayed over the wheel more evenly and more quickly than it could be done by a brush.

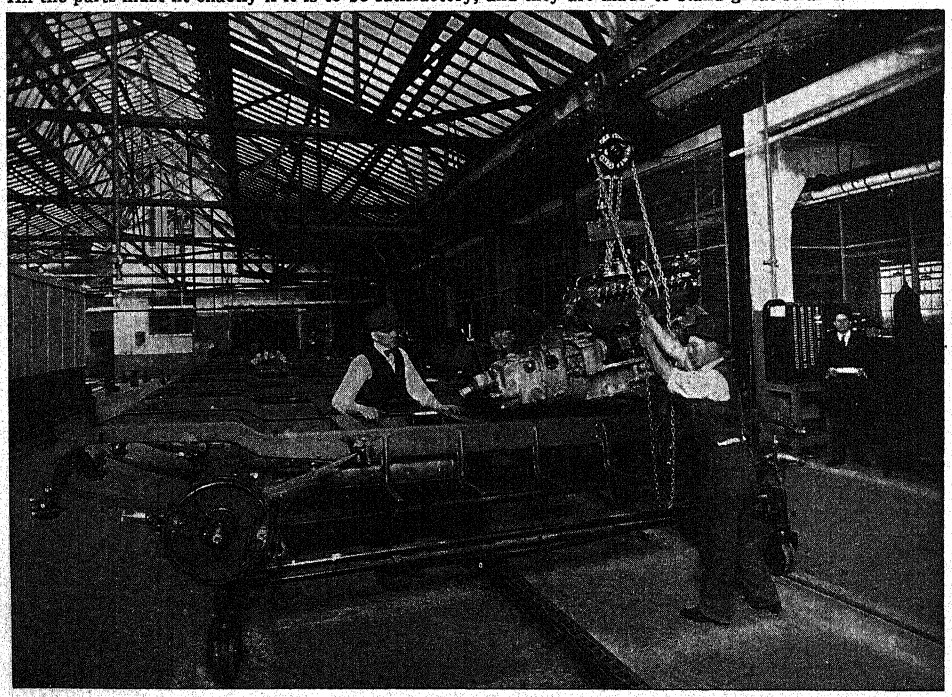


Many closed cars, or limousines, as they are called, have a wooden framework, covered with thin metal. Here are many bodies covered with aluminum. This, as you know, is the lightest metal in common use, but is very strong. These bodies will receive several coats of paint and varnish before they are completed. The touring car has a top of leather or fabric, which can be folded together, or else removed altogether.

THE ENGINE IS ALMOST READY TO RUN

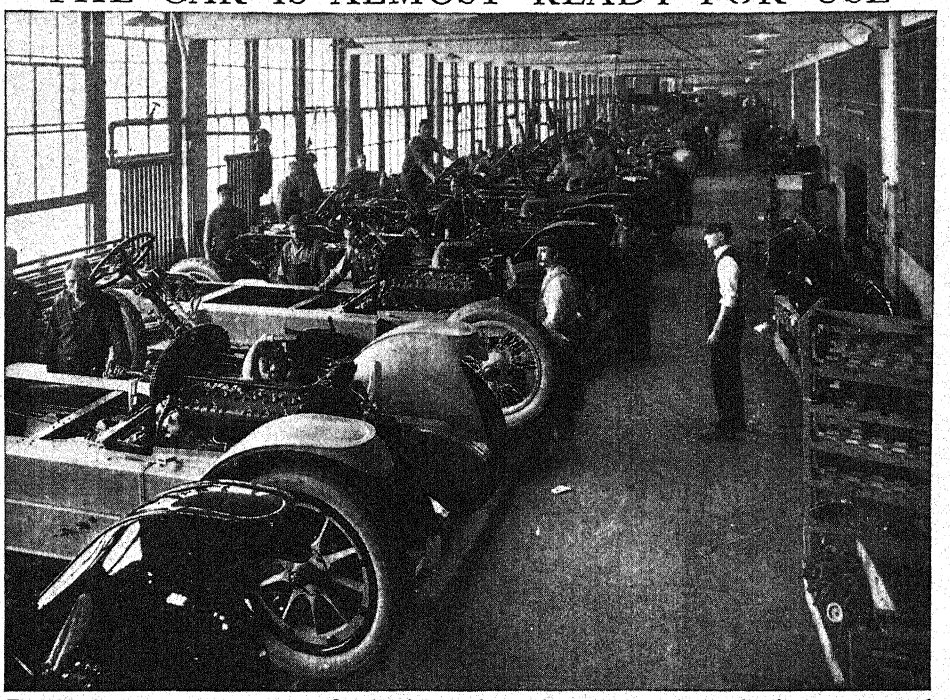


The crank case was placed on this moving truck some time ago, and as it went on, different men added the many different parts of the engine. It is now almost ready to be sent to the testing room. A high-grade motor engine has many parts, but is built with as much care as a watch, and runs quite as smoothly. All the parts must fit exactly if it is to be satisfactory, and they are made to stand great strains.

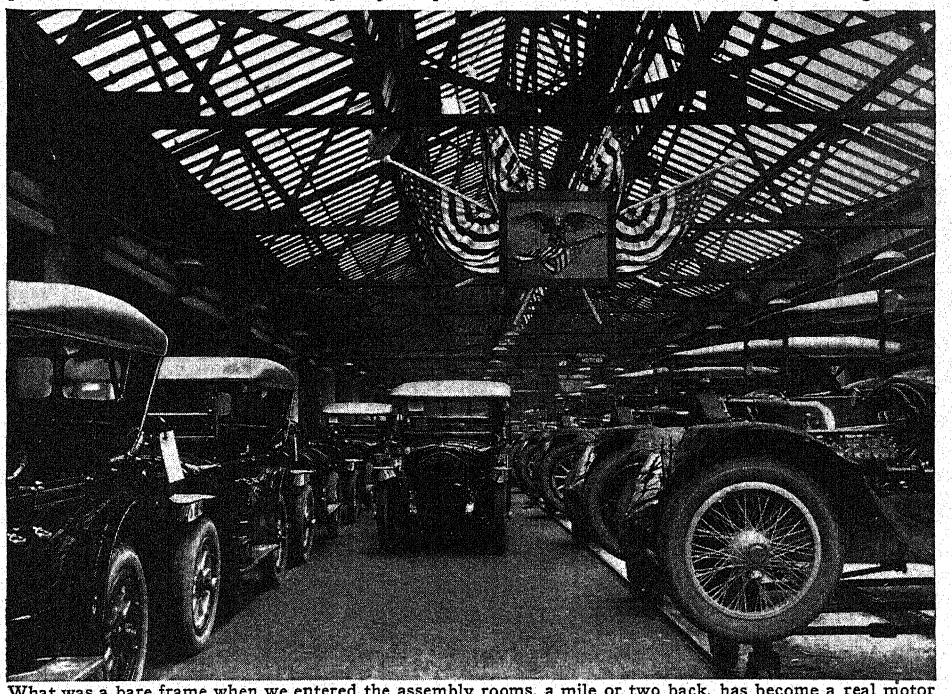


The engine is completed and is here being swung down upon the frame, which has been picking up parts as it, too, moved along on the truck. The engine will be fastened securely and then the frame will go on to have other parts attached. The frame may soon be called a chassis, which is French, meaning, foundation. It means the whole of the running parts taken together, while the remainder is called the body.

THE CAR IS ALMOST READY FOR USE



The chassis continues to move on. On the right is the stockroom, where thousands of parts are stored in order. As the truck arrives, each man adds something to the car before him, sometimes riding on the truck or the car itself for some distance until he has finished his work. Then he returns to the starting point. It is marvelous to see how quickly the parts can be attached. Later the body is swung down.



What was a bare frame when we entered the assembly rooms, a mile or two back, has become a real motor car, completely equipped and ready to run out under its own power, and start on a journey across the continent. The many tags attached to the cars on the left show that they have been inspected by several different men in their progress. The responsibility for the work is easily fixed by this method.

ARBOR AND THANKSGIVING DAYS



This picture, made from an old print, shows the artist's idea of the celebration of the first day of Thanksgiving at Plymouth, Massachusetts, about which the old records of the Pilgrim Fathers tell us. Its quaintness makes it attractive, even if it is not entirely accurate. In the early times of which it tells us, the day was kept as a solemn festival. Every one went to church and special sermons were preached.



The celebration of Arbor Day originated in the western prairie states, where there are very few trees, and a day was set aside for the planting of trees and vines and shrubs. In other states the rapid destruction of the forests has led the teachers to use the occasion to tell children of the importance of trees and to teach them to recognize the different kinds and their importance to the well-being of the nation.

WHAT THIS STORY TELLS US

EVERY nation has in the pages of its history some heroes, some great deeds or some incident in the national life which it desires to hold in remembrance, or some object to which it attaches some special significance. The United States is not behind in this. There are a number of the days on the calendar which are specially set apart as holidays, and this story tells us the special reason why this has been done. Most of these days are kept in remembrance of the past, one of them is kept so that the children of the present may be able to prepare a blessing for the children of the future.

THE DAYS WE CELEBRATE

CONTINUED FROM 4170

WHAT is a legal holiday? Almost every boy and girl will answer, "It is a day when all the schools and shops are closed and we don't have to work, and can have a good time." Yes, assuredly, a holiday is a day for having a "good time." But how many of you who hail Washington's Birthday and the Fourth of July and Thanksgiving Day so joyously ever stop to think of the real significance of the events which these holidays commemorate?

Such holidays are the memorial stones raised along the path by which a nation rose to greatness. Every country has its special days set apart from the routine work of the year in memory of some great man or great event in the nation's history or for the performance of some public duty to the State. Canada has Empire Day, Dominion Day, Victoria Day, the King's Birthday, Labor Day, and Thanksgiving Day. The United States celebrates the Discovery of America, the Landing of the Pilgrims, Thanksgiving Day, Washington's Birthday, Flag Raising Day, Independence Day, Lincoln's Birthday and (in the South) Jefferson Davis' and Lee's birthdays; Election Day, Arbor Day, Labor Day and several others in different states.

CHRISTOPHER COLUMBUS. DISCOVERY DAY, OCTOBER 12, 1492

It was the unswerving determination and courage of one man—Christopher Columbus, an Italian by birth—that first brought the great continent, on which our nation was to rise, to the attention of Christian Europe.

Columbus believed that the world was round and that by sailing due west, he would at last come to the northern part of Japan (the East Indies) and thus open a new route to the East Indies, the land of pearls and silks and spices.

Many thought that Columbus was mad, and everywhere men were too busy to listen to the plans of the "visionary dreamer," as they called him. So poor Columbus wandered from court to court of Europe, trying in vain to procure financial backing for his scheme, until he came to Spain. Here Queen Isabella became interested in his plan and, as we read in the story of the queen on page 2445, she gave Columbus ships for his voyage of exploration.

The difficulties that Columbus faced on that first voyage can never be truly known. In a strange sea, with rough weather and a mutinous, terror-struck crew, it was only the indomitable purpose of the man that kept them on their westward course. Daily the sailors implored him to turn his ships toward home. They swore that they were in a haunted sea and a thousand unknown terrors dogged their footsteps.

"I will not turn back till, with the help of God, I find that land," Columbus said. In his poem, "Columbus," Joaquin Miller has given us a wonderful picture of the calm courage and dogged persistency of the great dis-

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coverer. Every child should learn this poem, which you will find on another page of the book.

At last one morning a cry went up from the ships. Land was in sight! It was the island of San Salvador in the broad Atlantic. Thinking that he was near India, Columbus called the islands the West Indies.

Columbus made four voyages to the West and attempted to found Spanish colonies, but with little success. Courageous as his spirit was, he was ill from exposure in a foreign climate and he could not control the rough adventurers who came out to settle the colonies. Malcontents were continually returning to Spain to make trouble for him at court. They reported that he was mismanaging the colonies, treating the Indians badly, and taking the riches of the new land for his own use.

Much worried by these stories, Queen Isabella sent out a governor to inquire into matters. The new governor was jealous of Columbus and, landing with the authority of the Spanish sovereigns, he promptly threw him into prison and presently sent him home *in chains*. The proud heart of Columbus was almost broken. He went before King Ferdinand and Queen Isabella a gray, bent old man, the story of his misfortunes written on his face.

The king and queen were indignant at the treatment their faithful servant had received, and promised him four more ships for another voyage of exploration. On this last voyage Columbus sailed as far as the Isthmus of Darien, but his ships rapidly became so unseaworthy that he hastily turned them toward Hayti. They were unable to go further than Jamaica, where they remained stranded, and Columbus had to wait there for help which the governor refused to send for nearly a year.

Soon after Columbus returned to Spain, his good friend, Queen Isabella, died. King Ferdinand, absorbed in affairs of state, made no attempt to reward the old man for his years of faithful service to the Crown, and in May, 1506, he died in poverty, neglected by the country he had tried so faithfully to serve.

Four hundred years later the President of the great nation which had risen on the land discovered by Christopher Columbus made the following recommendation to the people of the United States:

"Now, therefore, I, Benjamin Harrison, President of the United States of America, in pursuance of the aforesaid anniversary of the discovery of America by Columbus, recommend the same as a general holiday for the people of the United States. On that day let the people, as far as possible, cease from toil and devote themselves to such exercises as may best express honor to the discoverer and their appreciation of the great achievements of the four completed centuries of American life."

This was the first celebration of Columbus Day. Now it is celebrated every year.

GEORGE WASHINGTON. PRESIDENT OF THE UNITED STATES. BORN FEBRUARY 22, 1732

It is interesting to know that the first public celebration of the birthday of General George Washington took place during his own lifetime. General Washington was one of the few great men who did not have to wait until after death for recognition of his greatness. Commander-in-chief of the American Army in the great struggle for independence and first President of the new nation, he was adored by his soldiers and revered by the people.

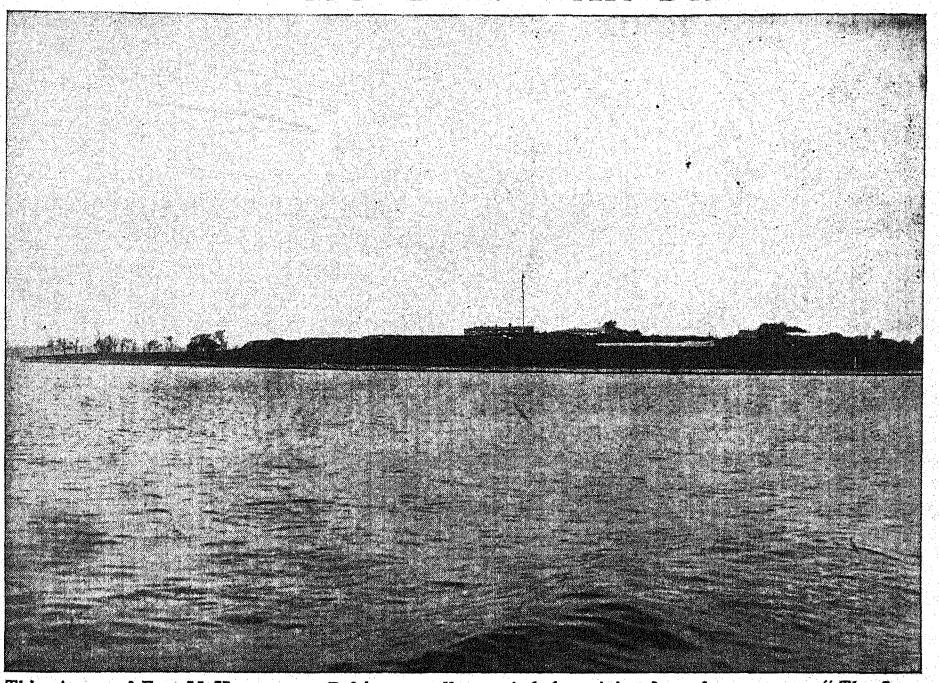
It was his friend, Count de Rochambeau, who, as a graceful acknowledgment of the good will between France and the new country, first celebrated the General's birthday. The French count had been in America barely six months and was stationed at Newport, Rhode Island, with his soldiers. His letter to General Washington, acquainting him with the holiday, is as follows:

"Yesterday (Sunday)," Count de Rochambeau wrote, "was the anniversary of your Excellency's birthday. We have put off celebrating that holiday till today, by reason of the Lord's Day, and we will celebrate it with the sole regret that your Excellency be not a witness of the effusion and gladness of our hearts."

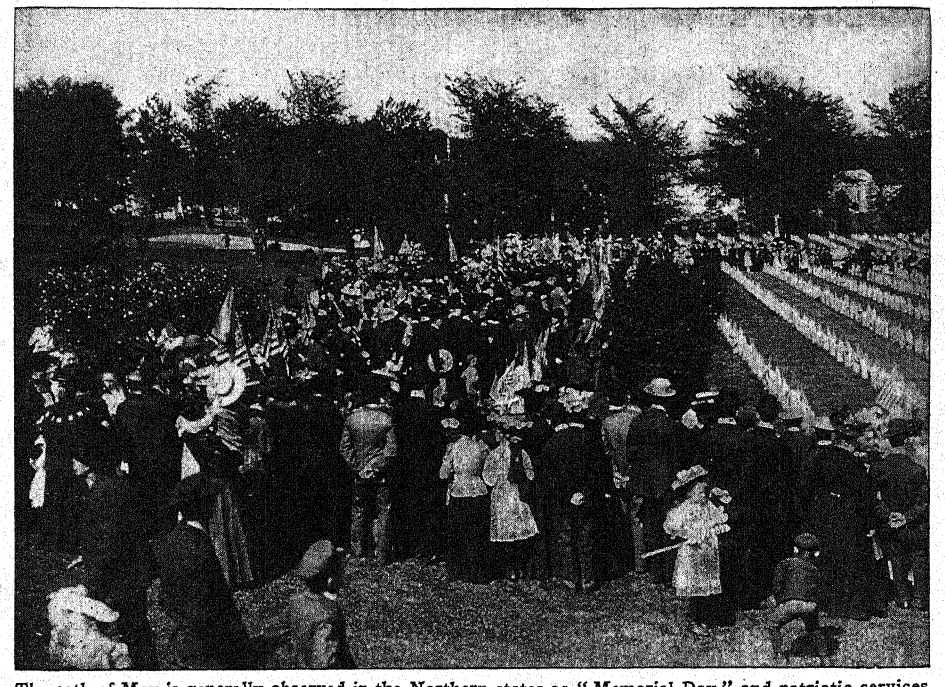
Washington received this letter while in his winter quarters in New York State, where he was anxiously watching the movements of the British army.

"The flattering distinction paid to my birthday," he replied, "is an honor for which I dare not express my gratitude. I confide in your Excellency's sensibility

IN MEMORY OF WAR DAYS



This picture of Fort McHenry, near Baltimore, calls to mind the origin of our famous song, "The Star Spangled Banner." The author, Francis Scott Key, was confined on a British ship during the bombardment in September, 1814, and the flag mentioned in the poem was the one flying from the fort, which all the British power could not force the defenders to haul down.



The 30th of May is generally observed in the Northern states as "Memorial Day" and patriotic services are held and the graves of the soldiers who died during the Civil War are decorated. Flowers bloom earlier in the Southern states and therefore "Decoration Day," as the corresponding holiday is often called there, occurs as early as April, in some states, but usually early in May. There is no uniform date for the holiday in all the Southern states. Some states keep one day and some another.

to interpret my feelings for this and for the obliging manner in which you are pleased to announce it."

After the Revolution, the celebration of Washington's birthday very naturally took the place of the observance of the King's birthday. Since then, Washington's birthday has been celebrated more or less generally throughout the United States, and to-day it is a public holiday in every state in the Union, and also in the District of Columbia, Porto Rico, Hawaii, and Alaska.

ABRAHAM LINCOLN. PRESIDENT OF THE UNITED STATES. BORN FEBRUARY 12, 1809

Abraham Lincoln was a child of the soil. Born in 1809, in Kentucky, in what was then almost a wilderness, he struggled upward with unswerving purpose against great odds. The contrast between the raw stripling of the western woods and the sad-eyed man at the helm of our nation through the storm of the Civil War is striking. When our country was divided against itself, the North against the South, brother's hand against brother, it was Abraham Lincoln who saved the Union.

"With malice toward none, with charity for all," with firmness in the right as God gave him to see the right, he steered the nation through the terrible time of its strife. "The strain of mind, the anguish of soul that he gave to his great task, who can measure?"

When President Lincoln died a martyr's death at the hands of a fanatic, his great mission had been fulfilled. The republic as a single, individual whole was "so firmly bedded in the hearts, the minds and the blood" of its citizens that the question of dissolution will never again enter their thoughts.

Look well at the face modeled by Borglum, of which you will see a picture on page 4664. Note the sane, sweet strength of the face, the firm, kind mouth, and the sad eyes and lined forehead that tell of great cares greatly borne. You will find the thrilling story of Abraham Lincoln in another place. He was one of the greatest men the world has yet seen, and his story should be graven on the heart of every American boy and girl, as a standard of high endeavor, and great thinking, without thought of self. Two of the greatest men in our history were born in February.

ROBERT E. LEE, BORN JANUARY 19, 1807: JEFFERSON DAVIS, BORN JUNE 3, 1808

The birthdays of the two great leaders of the Confederacy, General Robert E. Lee, and President Jefferson Davis, are set apart as holidays in many parts of the South. Jefferson Davis and Robert E. Lee, although they thought they owed a duty to their country, believed that they owed a higher duty to the states in which they were born, so when the Southern states seceded from the Union, these men followed their states.

Lee was earnestly opposed to disunion, but "If the Union is dissolved and the Government is disrupted," he said, "I shall return to my native state and share the miseries of my people, and, save in defence, will draw my sword against none."

Robert E. Lee, a distinguished engineer officer, had served in the Mexican War, and many thought him the ablest officer in the United States Army at this time. When the Civil War seemed about to come, President Lincoln sent Frank P. Blair to offer him the command of the Army of the United States. He was a graduate of West Point, and the offer of the command of the army in which he had spent his life was the greatest honor the President could offer him. But he did not hesitate an instant in taking the course that he believed to be right. "I am opposed to secession, but I will take no part in an invasion of the Southern states," he said, and resigned his commission.

A few days later he took command of the military forces of Virginia, then entered the Confederate service and finally became the General-in-chief of the Confederate army. General Lee's grasp of the situation in the South was masterly, and with the tremendous odds against him, he was able to win many victories, but finally surrendered with his army at Appomattox Court House.

General Robert E. Lee was not only a great commander, but a great man. He had the gift that drew men's hearts to him, and his soldiers gladly followed him. When the Southern army was surrounded at Appomattox and General Lee, unwilling to lead his brave fellows to certain death, surrendered, the men could not understand what had come to them. They had been preparing for battle and they gathered around in their tattered uniforms to

listen to the announcement. General Lee had surrendered! It could not be possible! But it was, and the men who had followed him through battle, hardship and starvation, broke down and sobbed like children when they learned the truth.

General Lee bore defeat as greatly as he had borne his duties and loyally recommended the South to accept the result in good faith. He had gladly risked all his possessions in the desperate championship of the Southern cause, and at the close of the war he was offered the presidency of Washington College, at Lexington, Virginia, now Washington and Lee University. He held this position until his death, a little over five years after the close of the war.

Jefferson Davis, although perhaps not such a lovable man as General Lee, was a man of great ability and strength of character. He was popular throughout the South and at the beginning of the Civil War was elected President of the Confederacy.

The strain of the awful years of war and the hardships of his imprisonment in Fortress Monroe after the war, broke down his health, and when he emerged from prison he was an old man. The Southern people have never forgotten the hardships that this man bore for their sakes, and to-day his birthday, as well as that of General Robert E. Lee, is observed as a holiday in several of the Southern states.

THANKSGIVING DAY. THE LAST THURSDAY IN NOVEMBER

The Pilgrims had been in the New World for nearly a year. The springtime sowing had taken place and all the summer the fields had been watched with great anxiety, for all knew that their lives depended upon the coming harvest. The summer crops came to a richness of fruition beyond all expectation and late one day in the fall Governor Bradford sent four men into the forests to shoot wild birds. "We will hold a harvest feast of Thanksgiving," he said, and invited the Indians who had been friendly to the strangers to rejoice with the white men. The Indians came bearing gifts of venison, and the harvest feast lasted three days.

This was the first Thanksgiving Day celebrated in America and little by little as new colonies settled the land the custom of a yearly Thanksgiving spread throughout the country.

General Washington perfectly expressed the spirit of the day in his Thanksgiving Proclamation in 1789:

"Whereas it is the duty of all nations to acknowledge the providence of Almighty God, to obey his will, to be grateful for his benefits, and humbly to implore his protection, aid and favors. . . . Now, therefore, I do recommend and assign Thursday, the 26th day of November next, to be devoted by the people of these States to the service of that great and glorious Being, who is the Beneficent Author of all the good that was, that is, or that will be; that we may then all unite in rendering unto him our sincere and humble thanks for his kind care and protection of the people of this country, and for all the great and various favors which He has been pleased to confer upon us."

For a long time the celebration of Thanksgiving in the South was considered a relic of puritan bigotry and it was not until 1857 that the day began to be observed there. Until the Civil War the celebration of the day was merely a state affair. During the Civil War it was suspended for a time, but in 1864 President Lincoln issued a proclamation appointing the fourth Thursday in November thereafter as a National Thanksgiving Day. When Lincoln was assassinated it almost caused this rule to pass out of existence, but the succeeding presidents took it up and since then Thanksgiving Day has been regularly observed throughout the United States. The proclamation by the president is sent to the governors of the different states, each of whom issues a corresponding proclamation for his own state.

PATRIOTIC DAYS. FLAG RAISING DAY. JUNE 14, 1777

Flag Raising Day was first recognized on June 14, 1894, when, at the request of "The Sons of the Revolution" and "The Colonial Dames of America," the Stars and Stripes were raised on all the public buildings, to commemorate the first use of the national flag.

The first American flag is said to have been made by Mrs. Betsy Ross, an upholsterer and seamstress who lived in Philadelphia. The story of why the stars and stripes were adopted is told in another place.

The thirteen white stars in the blue field in the upper left-hand corner of the new flag represented the thirteen colonies, as did also the thirteen alternating stripes of red and white. Later when Vermont and Kentucky entered the Union the number of stars and stripes was increased to fifteen, but still later Congress voted to return to the original thirteen stripes, adding a new star on the fourth of July following the admission of each new state.

Previous to the adoption of the national emblem each colony had its own flag. But when the new flag was approved by Congress, it was at once copied by patriots all over the country.



DANGEROUS FUN

It was the sight of this glorious flag floating on Fort McHenry that inspired Francis Scott Key, who had been detained on one of the British ships, to write our national song "The Star Spangled Banner," which you will find in the Book of Poetry.

INDEPENDENCE DAY. THE FOURTH OF JULY, 1776

Independence Day is a holiday that is observed in each and every state in the Union, and celebrates the adoption on July 4, 1776, of the Declaration of Independence, which declared our separation from Great Britain. It was Richard Lee who proposed to Congress "That these United colonies are and of right ought to be, free and independent states; that they are absolved from all allegiance to the British Crown; and that all political connection between them and the State of Great Britain is, and ought to be dissolved." John Adams seconded the motion, and Thomas Jefferson drew up the Declaration of Independence which has made him famous forever.

At the time of the adoption of the Declaration, John Adams wrote his wife a letter which reads like a prophecy: "I am apt to believe," he said, "that it (the day) will be celebrated by succeeding generations as the great anniversary festival. It ought to be solemnized with pomp and parade, with shows, games, sports, guns, balls, bonfires and illuminations from one end of this continent to another, from this time forward for evermore."

With true patriotic fervor Americans have thrown themselves into the celebration of this glorious event, and, wherever they may be, few of them forget to hold festival in honor of the birthday of the nation. There was a time, not very long ago, when children, and many grown up people too, thought the best

way to mark the day was to make as much noise as possible with firecrackers, or even firearms. But these days are past, and the day is spent in ways that are more worthy of the nation.

A DAY OF SORROW AND PRIDE. MEMORIAL DAY. MAY 30TH

From 1861 to 1865 our country was convulsed by a terrible Civil War. Brave men left their homes and their families by thousands to join the Army of the Blue or the Gray. Men burned with the zeal of patriotism, and whether they fought for the Union or for the South, they fought for the cause they thought was right. The women of the North and the South remained at home to sew and pray for the safety of their loved ones.

At last peace was established. The Union was saved, but at the cost of thousands of the lives of our country's bravest men. There was scarcely a village or a neighborhood in the North and none in the South that did not mourn its dead.

The women of the Confederacy began to go at various times in different places to strew flowers on the graves of their soldiers, and presently the beautiful custom spread to the North. General John A. Logan, commander-in-chief of the Grand Army of the Republic, set aside May 30th as Decoration Day for the graves of the Union soldiers who had died in the Civil War. Gradually the observance spread from state to state. The name was changed to Memorial Day, the better to voice the feelings of those who observed it. Each year the governor of each of the Northern and Western states proclaims the day as a legal holiday. As flowers appear earlier in the South the date of the observance is earlier there, in some states on April 26th, in others on May 10th.

ELECTION DAY. SET APART TO VOTE FOR OFFICE HOLDERS

We have been considering holidays which are memorial days, days set aside in memory of some great event or some great man. Now we come to those days which have been made holidays for the performance of some public duty.

Presidential Election Day comes once every four years and Congress has appointed the first Tuesday after the first Monday in November for this purpose, and almost all the states have chosen the same day for the election of their State officials.

No day brings greater responsibilities than Election Day. In most states every man over twenty-one years of age and in several states women as well as men go to the polls to cast their votes for the men who are to govern them and make their laws. In olden days the government was in the hands of a powerful few and it is only within a few generations that the franchise has passed into the hands of the citizens.

Since the signing of the Declaration of Independence the United States has stood for liberty and equal rights, and each voter who enters the polling booth is claiming his privilege to take part in the government of his country. The right to vote is something that every American boy and every American girl (for the time seems to be coming when all women will vote) should think about very seriously, for the future welfare of our country lies in right voting, in voting for honest measures and honest men to carry out those measures. In some countries, as we have seen in the Book of Countries, failure to vote is an offence that may be punished by law. In our country the decision is left to each person. Therefore there is all the more reason why each one should accept his responsibility and appear without fail to cast his vote in favor of men who will uphold the ideals of government inherited from the men who fought for them in the War of Independence.

ARBOR DAY—SET APART TO PLANT TREES FOR THE FUTURE

Arbor Day has been set aside by many states for the planting of trees and shrubs along the highways and in other places where they are needed. One purpose of this celebration is to implant in our boys and girls, our future American citizens, a love of Nature and the wonderful world about them. Another purpose is to impress the necessity of planting trees for the future.

There is no uniform date set apart for Arbor Day, as it necessarily varies in different states, owing to the differences in climate. It was first observed by the State Board of Agriculture of Nebraska, offering prizes for counties and persons planting the largest number of trees and vines throughout the state, with the result that over one million trees were planted in the first year, and over 350,000,000 trees and vines within the twelve

succeeding years. In the West there are many treeless plains and this beautiful and useful custom of planting trees at once aroused the interest of other states, and the plan was generally taken up throughout the country.

In the past, people have been wickedly wasteful in the way they have cut down the abundant forests all over our country. We are still destroying trees much faster than others grow to take their places.

The boys and girls who have kept Arbor Day year after year, planting small saplings and watching them grow inch by inch until at last they overhang the roadside, know the real value of a tree. They know it means cool, sweet air and a shady place to rest, and a beauty as straight and strong and soul-satisfying as God has ever made. Arbor Day stands for the preservation of our forests all over the land.

OTHER HOLIDAYS WHICH ARE OBSERVED IN VARIOUS PLACES

Besides the holidays already mentioned there are many other days of local importance merely, that are observed in the different states. For instance, Patriots' Day, April 19th; and Forefathers' Day, December 21st; are kept as holidays in Massachusetts and the former also in Maine; March 4th, every four years, is set aside for the Inauguration of the new President in the District of Columbia; May 20th, the anniversary of the signing of the Mecklenburg Declaration of Independence, is observed in North Carolina; March 2d, the anniversary of the Texan Independence, is celebrated in that state, while Good Friday is a holiday in some states.

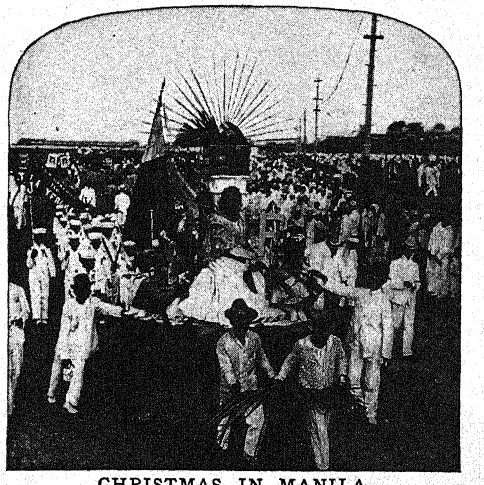
LABOR DAY. THE FIRST MONDAY IN SEPTEMBER

The first Monday in September is generally observed all over the United States and Canada as "Labor's Holiday." Then the great army of workers, rich and poor alike, all over the country, put aside their tasks for a day of rest and pleasure.

Labor Day was made a holiday in the District of Columbia by Congress in 1894 and is a holiday in the same sense as Washington's Birthday or the Fourth of July. But so far as the cessation of ordinary business is concerned—the signing and falling due of notes, the lawfulness of customary transactions, and so forth, Congress has no power to create a holiday in the states. The Congressional bill makes Labor Day a legal public holiday in the District of Columbia and requires the closing of all Federal offices throughout the United States.

WORLD HOLIDAYS. NEW YEAR'S DAY, AND CHRISTMAS DAY

Both New Year's Day and Christmas are legal holidays in the United States. The old custom of making and receiving



CHRISTMAS IN MANILA

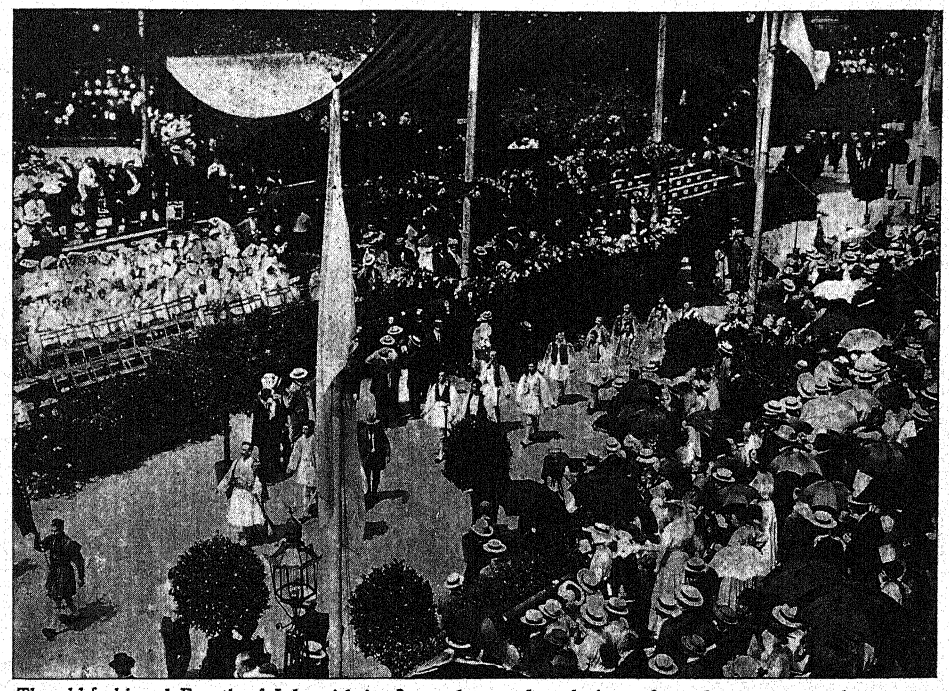
New Year's calls has almost died out, but wherever the winter climate will permit New Year's eve is celebrated with horn-blowing, fireworks and jollity. In Pasadena, California, a lovely fête of roses is given on January first, when beautiful processions pass through the gaily decorated streets, while automobiles, carriages, horses, bicycles and "floats," often having historical significance, are trimmed profusely with roses of every hue.

Christmas, as every boy and girl knows, is a most delightful day. People all over our broad land, even those who do not recognize its beautiful religious significance, unite joyously in this time of gift-giving and "good will to all mankind."

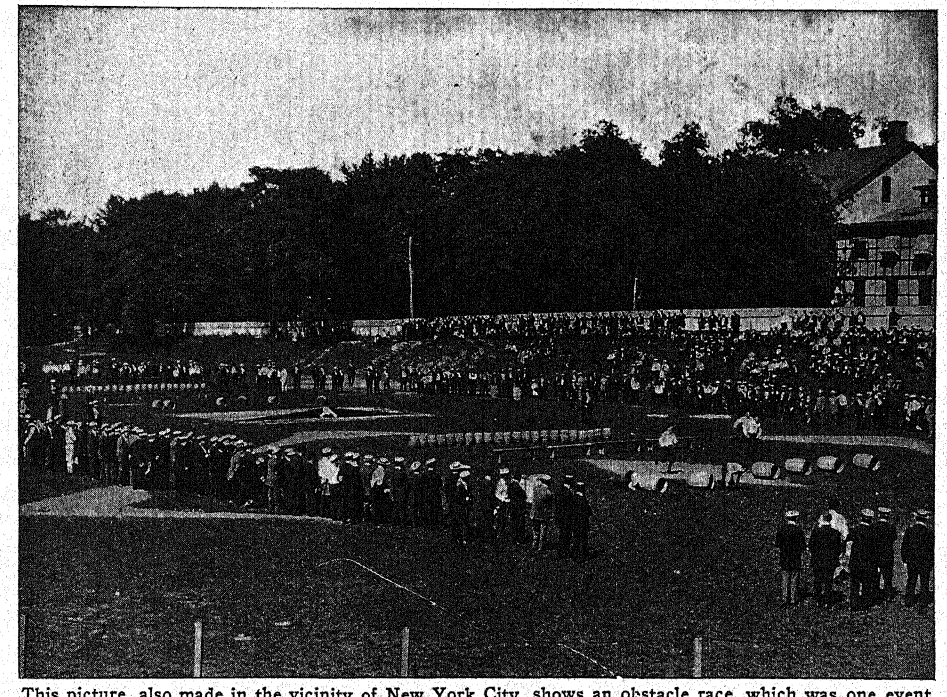
Long ago in the Puritan colonies, all exhibitions of gaiety and happiness were considered sinful and Christmas was not observed. In fact, the stern old Pilgrim Fathers made a law, forbidding any one to celebrate Christmas on pain of arrest and punishment. Now-a-days, however, Christmas is celebrated in New England just as it is everywhere else because a little Child was born in Bethlehem long ago.

THE NEXT STORY OF THE UNITED STATES IS ON PAGE 4567.

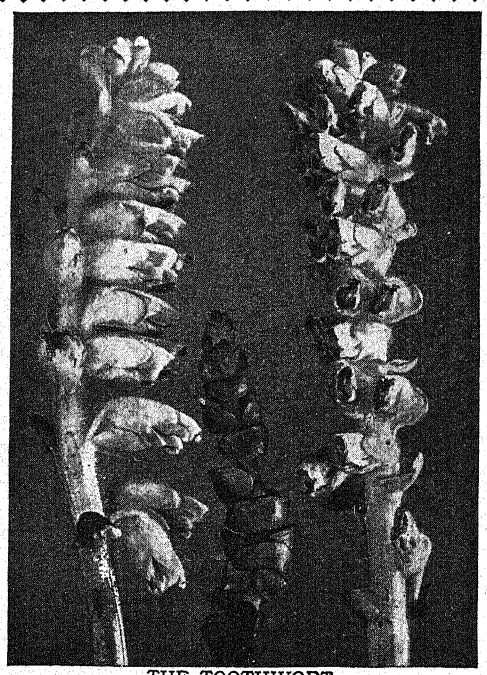
A SAFE AND SANE FOURTH



The old-fashioned Fourth of July with its firecrackers and explosions of powder became so dangerous, that all over the country other forms of celebration were substituted for the noisier forms. This picture shows part of a parade of nationalities, one of the first held in New York City, where much is done to teach children born in other countries that they are Americans, and to love their adopted country.



This picture, also made in the vicinity of New York City, shows an obstacle race, which was one event in the games held in celebration of the day. The authorities in this city have forbidden the sale and discharge of firecrackers, and fireworks may be set off only by special permission given to responsible parties, but celebrations are held to impress the day, and what it means, on the minds of the children.



THE TOOTHWORT

This plant has a fleshy stem covered with tooth-like scales, and its flowers are of a dull red color. It grows among dead leaves and on the roots of trees, and spends the greater part of its life underground.



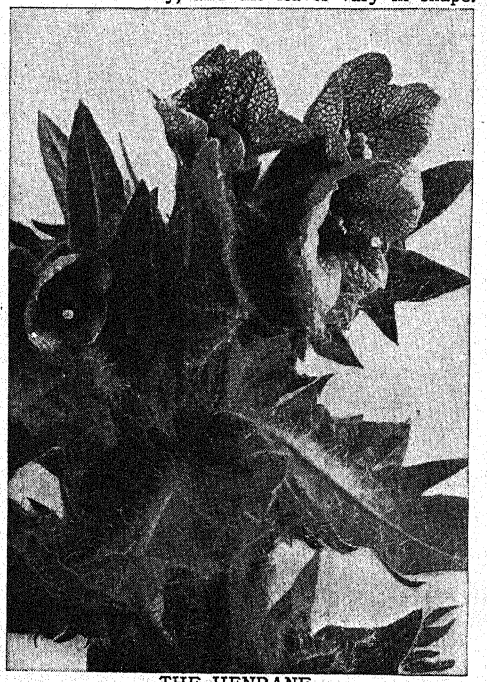
THE FIELD SCABIOUS

The pale lilac flowers of the field scabious are conspicuous in grain-fields, although they are not confined to the field, but may be seen in the hedgerow. The stem is hairy, and the leaves vary in shape.



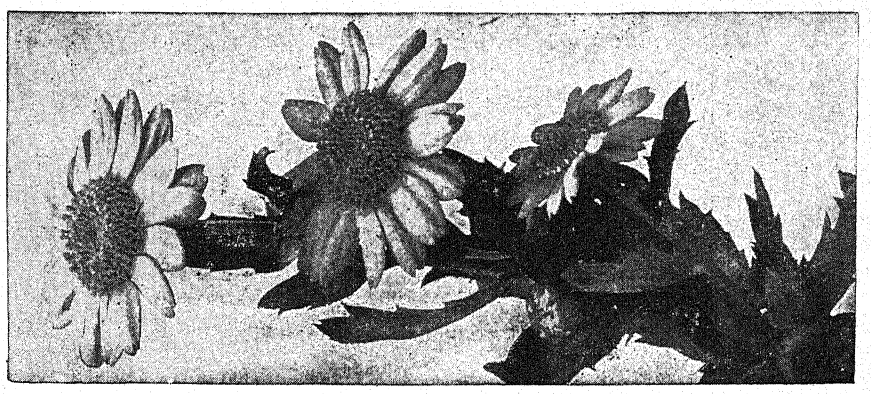
THE COMMON CHAMOMILE

The name chamomile means ground-apple, and refers to the pleasant apple-like smell of the plant. Made into tea, it is a good remedy for indigestion, and even to lie on a bed of chamomile and inhale the odor is helpful. It belongs to the Aster family.



THE HENBANE

This hairy and unattractive plant, with its dingy yellow flowers veined with dull purple, is not a native of England, but was formerly cultivated in herb-gardens, and, escaping, became a wild flower. It has an unpleasant odor. Another name is the devil's eye.



LITTLE KNOWN BRITISH FLOWERS

CONTINUED FROM 4356

THERE are, as may be supposed, many flowering plants in Great Britain and elsewhere in Europe that Americans rarely hear of, even in literature. Some of them, if sufficiently handsome, are brought overseas as garden plants; a very few become naturalized to a slight extent, and some are used medicinally. Others, while favorites with people in the Old World, are still new to us.

THE CHAMOMILE, SOURCE OF A FAMILIAR DRUG

If we lived across the Atlantic we should find that perhaps the most widely known, on account of its former extensive use as a medicine, would be the chamomile, whose little heads, made up of many minute white-rayed flowers, are plucked and dried. From them is extracted the medicine. The chamomile is also frequently cultivated as a border plant, the flowers being prettily surrounded by feathery foliage. It is a member of the aster family.

THE HENBANE THAT YIELDS A POISONOUS DRUG

The leaves of the ugly henbane, that are very poisonous, nevertheless will afford a quieting medicine, when properly treated. It belongs to the potato family, in which there are an amazing number of poisonous plants. We shall find several of them illustrated in other articles,—the thorn apple, the deadly and woody nightshades, etc. The henbane, "so called from the baneful effects of its seed upon poultry," was one of the plants that witches were supposed to use in their concoctions and ointments. It has become somewhat naturalized in waste places, so that we should remember that it is a tall plant of rank odor, with coarsely wavy-toothed leaves, sometimes nearly a foot long, hairy and gray-green. Its somewhat open, funnel-shaped corollas are greenish-yellow, covered with a network of purple veins. The capsule is enclosed in the enlarged calyx.

THE FIELD SCABIOUS, OR "DEVIL'S-BIT"

The field scabious is very like the cultivated scabious in our gardens. Dozens of little flowers are grouped in a head, but it is not a composite, as the anthers are not joined in a ring, but one of the teasel family. Although tubular at the base, the flower flares out into a sort of one-sided brim, making a convenient landing-stage on which insects may perch. The scabiouses are very rich in honey, and some are very hairy to prevent snails and unwelcome insects from crawling up on the stems to steal it. All the

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flowers in a head display their anthers before the stigmas become ready to receive pollen. By this arrangement some of the pollen of each flower's anthers is likely to fall on its own pistil. It is supposed that if an insect brings pollen from some other flower it will be chosen by the pistil in preference to that of its own flower; but if not, the latter is sufficient to fertilize the seeds.

THE TOOTHWORT, WHICH LIVES CHIEFLY UNDERGROUND

One of the most curious plants that we should find, would be the toothwort, that spends most of its life underground, drawing its food from the roots of trees and shrubs, and thrusting out long, scaly shoots, but only once a year sending up into the air flower-bearing stems. These thick, fleshy stems are all white, or with a faint tinge of purple (this pallid tint being very conspicuous on the brown forest-floor), and are bowed at the top, which is covered with flowers, while the lower part is clothed in thick scales, which are all the leaves it possesses. If we dig carefully around it, and trace these stems downward, we shall find its rootlets are attached to the rootlets of the tree by swollen suckers.

The toothwort, however, is only partially a parasite. It has very complete arrangements for cross-fertilizing the flowers during their brief existence. The stigmas ripen before the anthers, and protrude from the corollas before these latter are fairly open. They can be pollinated, in this stage, by pollen from some other flower more fully developed, in which the anthers have been forced out of the corolla. The bee that brings the pollen, while seeking honey, secreted by a cushion under the base of the pistil, has been well sprinkled with pollen, fallen from anther-cells that he has forced apart during his probing of the older flower. In case no insect visits a flower, the pistil dries up, and the stamens still further elongate and push their anthers so far out, that the wind empties their pockets, and the flour-like pollen falls on some young unshriveled pistil, further down the spike.

THE SALAD BURNET, A MEMBER OF THE ROSE TRIBE

If we should walk over parts of the downs in Southern England we might sometimes feel certain that somebody close at hand is slicing up cucumbers, owing to the odor that comes to our nostrils. A little close attention will prove that the scent arises from the spot where we are standing. If we gather one of the leaves of the plants beneath our feet we shall find that the scent is scattered because we are crushing them with our shoes.

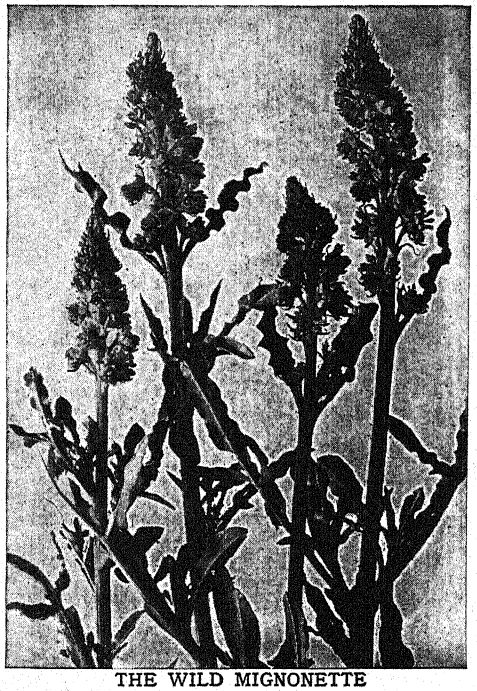
The plant is the salad burnet, a member of the rose family, though our first sight of the flowers would never lead us to suppose it is so related. Its long, narrow leaves, which may be nearly a foot in length, lie flat on the ground, and are divided into a number of coarsely toothed oblong leaflets in pairs. From the centre of the leaf-rosette rise the flower-stalks, a foot or more high, on whose summit is a head of tiny purplish flowers without petals. The lower flowers in the cluster have stamens, the upper ones pistils, and the pollen is carried by the wind. The leaves used to be put into salads instead of cucumber.

THE SPURGE-LAUREL, WHERE THE BEES FIND FOOD

A shrub that is occasionally cultivated for its evergreen foliage, and that may be found in flower in the earliest days of the year, is the spurge-laurel, a plant that very few persons appear to know, even in districts where it is common. It seems to be passed over as a laurel or a rhododendron. It has a branching stem three or four feet high, the greater part of which is bare of leaves. These are borne only on the upper part, and are large, leathery and evergreen, oval and lance-shaped, and somewhat drooping on all sides of the stem, forming a perfect roof over the blossoms. The yellow-green flowers are produced in drooping clusters from among the leaves, and are tubular, with four spreading lobes at the mouth. They have eight stamens, a single pistil, and are sweet-scented. The early bees and butterflies know they can get refreshment in the spurge-laurel's flowers.

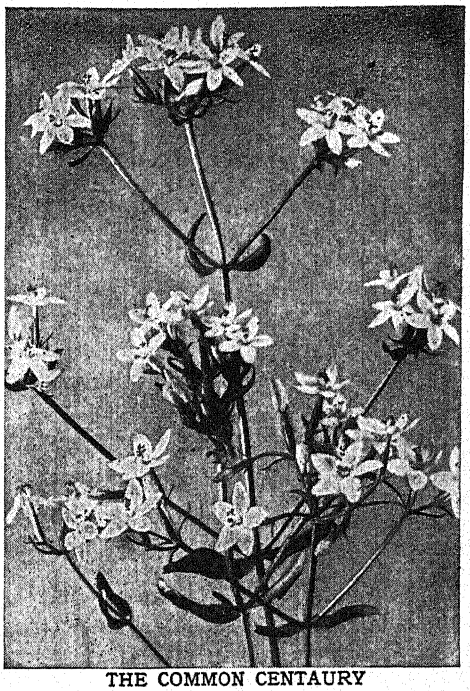
EUROPEAN ORCHIDS THAT GROW IN THE GROUND

There are several orchids to be found in the wood. The earliest are the tway-blade, one species of which is also found in America, and the tall spotted orchis, with white flowers streaked and spotted with red or purple. Then there is the white helleborine, with pale leaves and pure white flowers that never open widely.



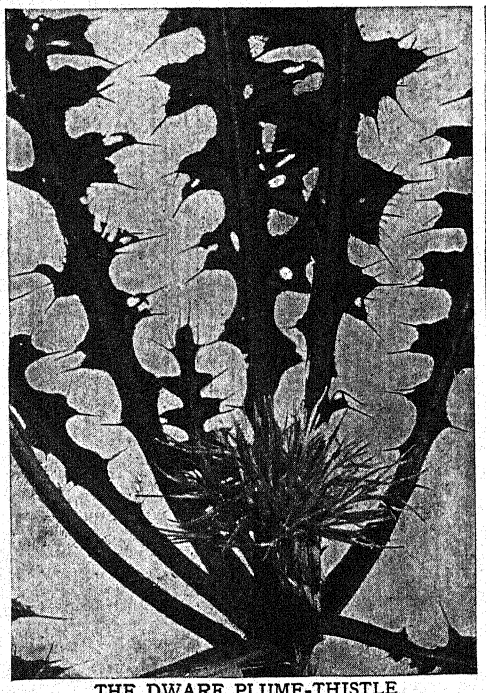
THE WILD MIGNONETTE

We can all recognize this bushy little plant by the resemblance of its flowers to those of the garden mignonette. It is, however, stiffer and more upright, and the perfume is not quite so fragrant.



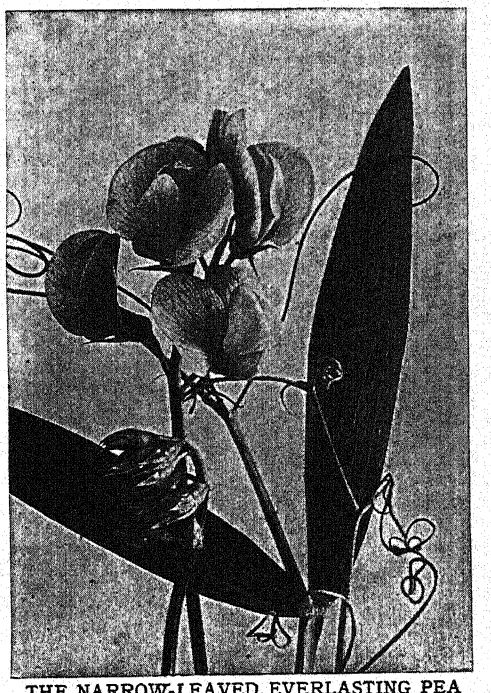
THE COMMON CENTAURY

This neat little plant, with its pretty funnel-shaped flowers, varying in color from the usual rose-pink to the rarer white, blossoms from June to September. The flowers close at evening-time or when rain falls.



THE DWARF PLUME-THISTLE

Unlike the other thistles, this plant is practically stemless, and its solitary crimson flower nestles in the midst of a rosette of leaves. It is also called ground-thistle.



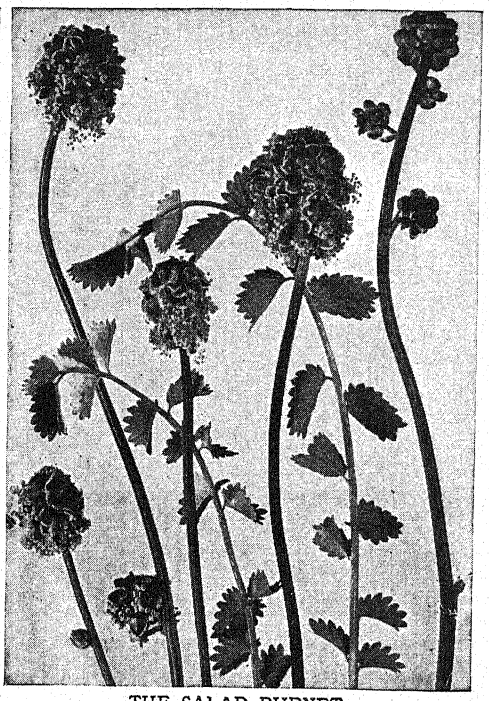
THE NARROW-LEAVED EVERLASTING PEA

This plant, with rosy-pink flowers and greyish-green sword-shaped leaves, trails or climbs over the other plants among which it grows. It makes good fodder.



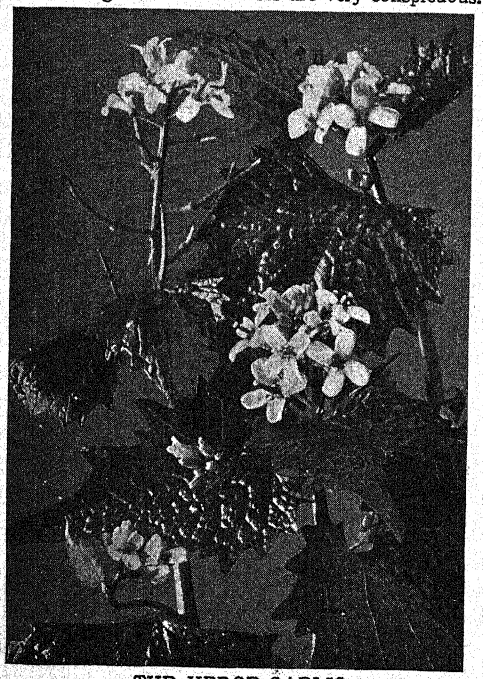
THE GRASS VETCHLING

It is impossible to discover the grass vetchling, or grass pea, until it is in bloom, for it looks exactly like grass, but its bright crimson flowers are very conspicuous.



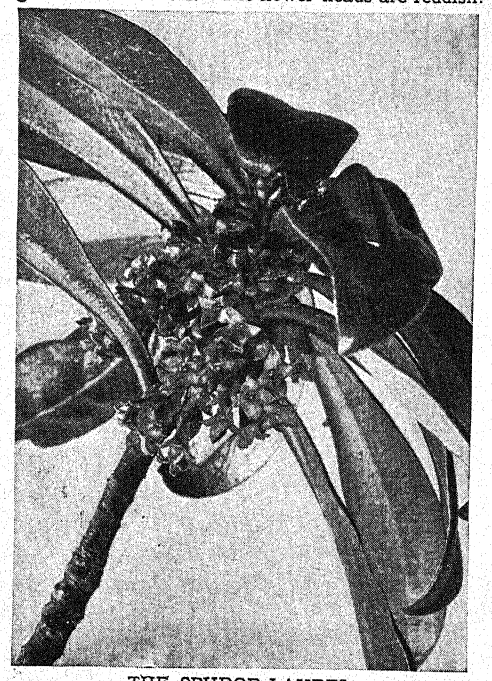
THE SALAD BURNET

The leaves of this plant taste and smell like cucumber, and, as its name implies, the plant was once used a great deal for salads. The flower-heads are reddish.



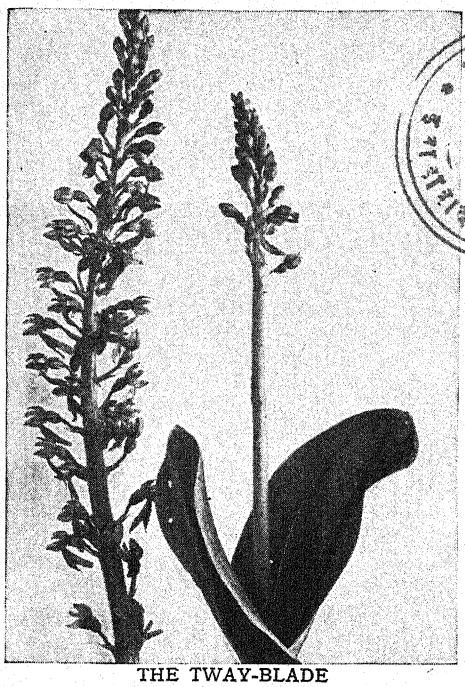
THE HEDGE-GARLIC

The smell of the hedge-garlic, or jack-by-the-hedge, is certainly not pleasant, but its clusters of white flowers are very dainty. In Wales it is often fried with bacon. When bruised the leaves give out an odor of garlic.



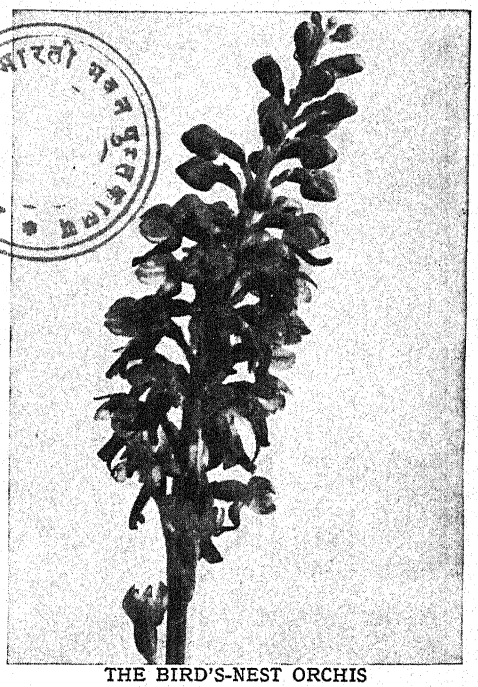
THE SPURGE-LAUREL

The yellow-green flowers of the spurge-laurel, that grow in clusters, change into bluish-black berries, so poisonous that quite a few are sufficient to cause death. The bark is often used to make a lotion.



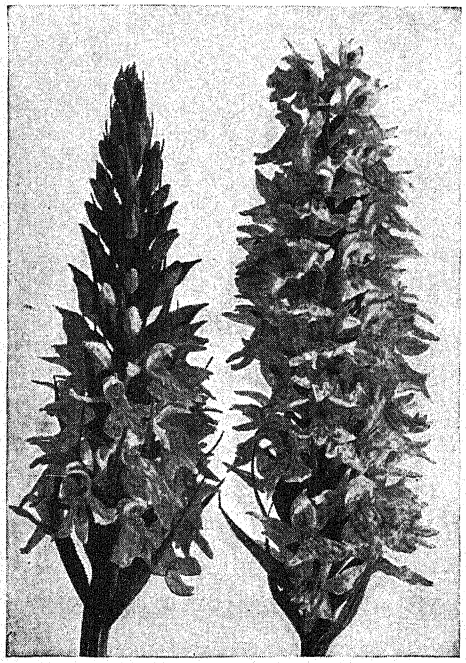
THE TWAY-BLADE

Because of the two very large leaves, which are much more conspicuous than the stem with the little yellowish-green flowers, this plant received the name of tway-blade, or two-blade. It is covered with down.



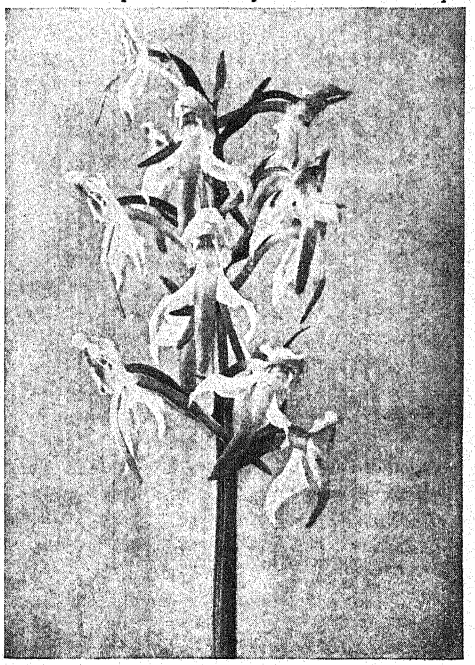
THE BIRD'S-NEST ORCHIS

There is no green about the bird's-nest orchis, for stem and flowers are alike, yellow-brown. The name is given because of the interlacing of the roots. This plant looks very much like brown rape.



THE SPOTTED ORCHIS

The pyramid-like spike of lilac flowers, streaked with purple, and the lance-shaped leaves, spotted with purple, make this a noticeable plant wherever it grows, which is usually in moist meadows and woods.



THE GREATER BUTTERFLY ORCHIS

The greenish-white flowers of the greater butterfly orchis have little resemblance to a butterfly, although it is from a fancied likeness that the plant gets its name. Its pollen is carried by moths.



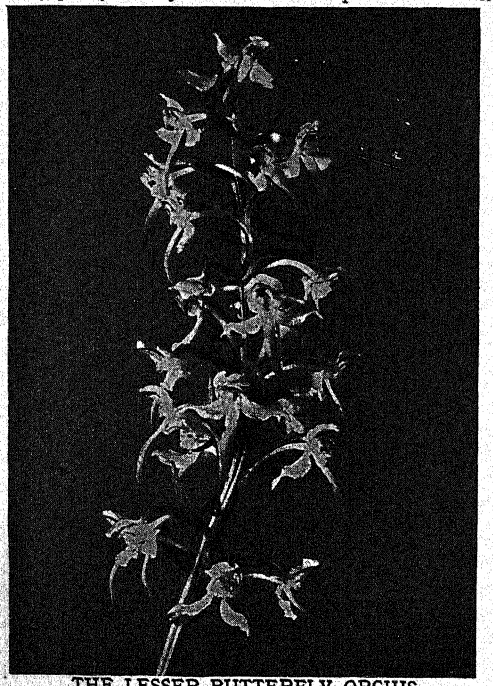
THE FLY-ORCHIS

This orchid grows as a slender plant a foot high, and is often passed unnoticed. It is not at all common, but its flowers, somewhat resembling a fly, are very pretty. Only two flowers are open at one time.



THE GREEN-WINGED ORCHIS

In general appearance this orchid is very much like the purple orchis, but its leaves are narrower and the flowers are darker. It blooms from April to June in meadows as far north as Northumberland.



THE LESSER BUTTERFLY ORCHIS

This is the more common butterfly orchis, the fragrant flowers of which are whiter and smaller than those of the greater butterfly orchis. It is the finest of our orchids, and is well worth the finding.



THE BEE-ORCHIS

This beautiful orchid is worthy of its name, for, while other plants have been called after various objects whose resemblance it is difficult to trace, the flower of this plant bears a startling likeness to the bee.

These are all May flowers. In June we may find the strange, leafless, bird's-nest orchis, of much larger size, with yellow-brown flowers, near the roots of the beech; and in September there is the purple helleborine with stems three feet in height.

ORCHID FLOWERS WHICH RESEMBLE INSECTS

In summer, should we come across a damp place on the wide heaths, we may find there the butterfly orchis. It has two large oblong leaves near the ground, and a stem a foot or more in height around which a crowd of whitish moths appear to be hovering. If we find them about twilight, they will look whiter and more moth-like than in the daytime. The truth is that what appear to be moths are the flowers of this orchis. Its pollen is carried by moths, and to suit their long tongues the nectar is stored in a long hollow spur that projects behind the flower. It is very likely that the appearance of the moth-like flowers attracts the real moths. When they find out their mistake, they are detained by the fragrance of the nectar.

THE BEE-ORCHIS

The downs, too, are a fine place for British wild orchids. We shall find there the beautiful bee-orchis, with its pink and white sepals and petals spread out like wings, and the broad, curved lip striped with brown to resemble a bee's body. The fine tip of it is curved underneath, and might well be the bee's sting. In some seasons this is abundant, but less so than is the fly-orchis, which has only about two flowers open at a time, and these look wonderfully like a fly with a brown body and a patch of blue on the back. The flower seems to have eyes and antennæ also.

Then there is a taller-growing kind, the green-man orchis, with many greenish flowers. A shorter kind, with green body and round head striped with red, is called the frog-orchis. A still smaller one, with dark purple and green flowers spotted with white, is called the dwarf orchis. It is very plentiful but not easily seen among the grass, unless we are really hunting for it.

Down in the meadow we shall find two kinds of orchis, the early purple orchis and the green-winged orchis. Though both are much alike in growth, and both have purple flowers (sepals as well as petals being colored), the green-winged orchis has strong green lines along its sepals, which are half closed, so that, with the upper petals, they form a hood over the rest of the flower.

AN ORCHID THAT SHAKESPEARE KNEW

Into her fantastic garlands Ophelia twisted that early orchis called

> "Long-purples,
> That liberal Shepherds give a grosser name,
> But our cold maids do dead men's fingers call them."

In all orchids there is only one two-celled anther, and its shape is peculiar. It is joined to the style of the pistil, and with it forms what is known as the column. On the lower part of this are two stigmas, usually broad and flat, run together so as to appear like one, above which is a narrow shelf-like projection (the beak) over which is the anther. The pollen is gathered into two pear-shaped masses which stand just within the pouches of the anther, and at the lower end of each there is a sticky knob, which lies "loosely in a cup-shaped envelope" which is the above-mentioned beak, projecting like the prow of a boat at the portal of the nectary. The bees or flies or wasps use the lower petal, or lip, as a platform, and, in pushing their heads into the flower, they touch against the beak, which promptly breaks open and exposes the sticky knobs of the pollen-masses. These instantly stick to their heads, and are pulled out of their pouches when the insects retire. The remaining pollen falls over in front, where it looks like a pair of horns. When next the bees visit an orchid flower (and we know that, as far as possible, the bees keep to one kind of flower on a journey) these drooping pollinia at once strike against the stigmas, where they leave some of the pollen.

JACK-BY-THE-HEDGE, OR HEDGE-GARLIC

The Jack-by-hedge, or hedge-garlic, is a British member of the cress family. It flowers in spring close in the shelter of the hedges, as well as farther afield. In its first year it produces rather large leaves, which are sometimes mistaken for those of the violet, but they are much too round to long confuse one; when bruised, these leaves give out a strong

odor of garlic. Racemes of small white flowers spring from a tall stem, that has itself arisen from a thick root, which has been growing for a year past.

A PEA-PLANT WHICH HAS LEAVES LIKE GRASS-BLADES

In the meadow blooms the beautiful grass-pea, which has no tendrils, and no true leaves, but leaf-stalks flattened out until they resemble grass-leaves; and unless we saw the plant in flower we should pass it as a grass, especially as it grows among the grasses. But when its bright crimson flowers appear, there is no danger of mistaking it for any other plant. As a rule, there is only one flower on each long stalk. The seed-pods are flattened, and look like bent down grass blades.

PEA-BLOSSOMS WHICH FORCE BEES TO CARRY POLLEN

Another pea, the narrow-leaved everlasting pea, scrambles over the thickets, thrusting out its clusters of flowers (and, later, smooth pods), about two or three inches long, filled with little peas. This everlasting pea springs up every spring from a perennial, thick, creeping root-stock. We may find a plant that has climbed up fairly straight by means of its long, branched tendrils, reaching upwards for five or six feet. The stems appear broad and flattened, since two wings project from the main rounded portion, and reach from root to tip. Its leaves are divided into two long, sword-shaped leaflets. There are about ten flowers in every cluster, each with a rosy-red standard, or large upper petal, while the pair of wings that embrace the keel are purple.

These pea-blossoms, that are very closely allied, have a very pretty way for powdering their insect messengers. The five-petaled pea-flower has two wings and an up-starting standard that represent three petals. The other two have joined together, except for a narrow slit at the top, forming a boat-shaped pouch, called a keel, in which snugly repose the pistil and stamens, the latter partly united, and all curved upwards so that the tip of the pistil lies in the tip of the keel. When a heavy bumble-bee alights on the keel, or on the convenient wings, by an interlocking device she presses down the keel, so that instantly the pistil and stamens pop out of the slit in the keel and project far enough to tap the insect on the under side, leaving some pollen there. Moreover, there is a little brush-like affair developed in connection with the style, that sweeps out the pollen from the keel the moment the bee alights. And, of course, the stigma collects whatever pollen has been previously deposited upon the bee by another flower. As soon as the bee has flown away, the keel springs back to its former position, and thus covers the stamens.

THE PINK-FLOWERED CENTAURY, WHICH HAS TRAVELED FAR

The pink-flowered centaury is very closely allied to our pretty sabbatias, and although one would hardly suspect it, belongs to the gentian family. Its anthers twist spirally as they mature. As is also the case with the wild mignonette, the centaury is occasionally found in our waste places.

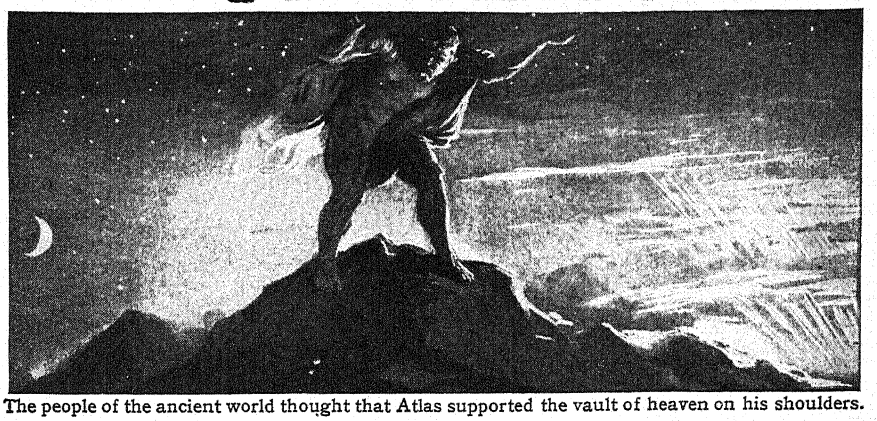
THE DWARF PLUME-THISTLE OF LEGENDARY FAME

The real Scotch thistle, that one which legend says saved Scotland from a Danish attacking party by causing one of them to shriek when he stepped on it, thus raising an alarm, has never been really identified. Certainly it would seem that the dwarf plume-thistle, cowering near the ground, might have answered the purpose. It certainly would be more easily trodden upon than the taller kinds. It probably needs its very effective armament of thorns to protect the soft flowerets and fleshy foliage from being devoured by browsing cattle.

ROSEMARY, APPROPRIATE FOR A BRIDAL

Aromatic rosemary, which we plant as a flavoring herb in our gardens, is a branching shrub of the mint family, having small leaves and flowers. It can scarcely survive our northern winters, but is evergreen in Europe, and was supposed to strengthen both the senses and memory—perhaps with its pungent odor. Therefore it served in Elizabethan times, when there was a graceful custom of expressing one's thoughts by means of flowers, as a sign to express the hope for long memory and long life. "There's rosemary, that's for remembrance," says Ophelia. Sprays of it, sometimes dipped in perfumed water, sometimes gilded, were given, with bay-leaves, to wedding guests and carried in marriage processions.

THE NEXT NATURE STORY IS ON PAGE 4557.



The people of the ancient world thought that Atlas supported the vault of heaven on his shoulders.

COULD THE SKY FALL DOWN?

CONTINUED FROM 4377



THE sky could not fall down because there is really no such object as the thing we call the sky. It often appears to us as if we lived inside a great bowl turned upside down; the sun, the moon, and the stars seem to be fixed in that bowl, and to be moved round as it moves. In all ages men have had this idea, and we refer to it in such a phrase as "the heavenly sphere."

But when the movements of the heavenly bodies were more carefully studied, it was supposed that there were more spheres than one at different distances from us. In our clear climate we can get a clearer idea of the sky in the form of a great sphere than appears to men in some parts of the world.

If the sky were made like a great dome, we should indeed wonder what keeps it up. But what we see is only light reflected from the air of our own earth. The blue looks very far away, but from forty to sixty miles, at the very outside, is the greatest distance from which the light is reflected by the air to our eyes; and it is the effect of this reflection that we call the sky.

WHAT SET THE SUN ON FIRE?

The sun is not "on fire," in the same way that an ordinary fire is. We are certain of this for two reasons; first, because, at the high temperature of the sun, burning, or combustion, could not occur, curious though that at first seems, and, second, because it can be proved that the sun must long ago have burned itself out if its heat and light were obtained from burning. It is possible to reckon about how much power the sun produces, and we are bound to look to something other than burning to account for it all. The question where the sun gets its power from is most important.

Burning is out of the question; heat must be produced by the atoms striking one another as the sun shrinks under the action of its own gravitation; light and heat falling upon the sun from other stars accounts for a little; and it is now thought that probably most of the sun's power comes from inside its own atoms. And they received their power, first of all, from the Author of all the power in the universe.

ARE THERE ANY STARS IN THE HEAVENS LARGER THAN THE SUN?

This is a question which science cannot answer with certainty until it is possible to find the distance of the stars. No telescope in existence enables us to see the size of a star. We never see its disk, but only a point of light. This gives some idea of the tremendous distances of the stars.

Now, if we cannot actually measure the size of a star because we cannot see anything to measure, our only means of information is the brightness of the star. But brightness, as such, tells us nothing. The little moon is far brighter to us than all the stars put together, not because it is bigger, but because it is so very near. Therefore, if we are to learn anything about the size of any star we must first find its distance from the earth, and then compare its *apparent* brightness with its distance. From this we can judge the star's *real* brightness; and from that we may reasonably make a guess as to its size.

This is not a very certain thing, because we are only judging from brightness, and a star has very different degrees of brightness at different stages in its history, though it may be of the same size all the time. Also, we may sometimes be able to notice what power of gravitation a star has upon a near neighbor, and as we know exactly what is the law of gravitation and mass, we can measure a star's mass, though not exactly its size, in this way.

And so we find that our sun is a star of only very moderate size. The heavens are filled with many that are probably far larger. A star named Canopus, which cannot be seen from our hemisphere, is reckoned to be probably thirty thousand times as large as our sun; and there may very well be many other stars, or suns, far larger even than Canopus.

DOES THE SUN EVER MOVE?

Indeed, everything is always moving in one way or another. Galileo was imprisoned and silenced for saying that the earth moves, and now every child knows that it does. Once men thought that the sun remained perfectly still, while the planets and their moons moved round it. But we have learned that that is not true. The sun has two movements. The first is interesting, but the less important. Like the earth, the sun spins, or rotates, upon itself, and in the same direction as the earth. Thus, we can notice a sun-spot appear at one side of the sun, travel across its face, disappear for several days, and then reappear where we saw it first.

But besides this movement of rotation, the sun has a movement of translation, as it is called—that is, an actual bodily movement from place to place. We do not doubt that all the other stars are in motion too. It used to be impossible to see any sort of arrangement or order in the movements of the sun and the other stars; but lately a German astronomer, Professor Kapteyn, and others following him, seem to have shown that the stars consist of two great hosts, which are streaming through or past each other in opposite directions and at different speeds, and they think that our sun belongs to one of these groups of stars. Of course, where the sun moves he carries all his family with him—planets, moons, comets, and so on—together with everything that is born and borne upon them. But neither astronomer nor any other scientist can yet tell us where the sun is carrying us, nor what the result will some day be.

HOW DOES A SAILOR KNOW HIS WAY WHEN IN THE MIDDLE OF THE OCEAN?

For many long centuries the sailor who ventured out of sight of land had only the stars by which to guide himself. As long as the stars are to be seen, they serve the sailor's turn. From the northern hemisphere of the earth, where we live, and where the greater number of mankind and all the great nations of the past have existed, there can always be seen, when the sky is clear, the North Star, or Polar Star, which indicates the north. Once this is known, all directions are known.

There is good reason to suppose that, as in many other cases, the Polar Star has changed its position, even within the score of centuries or so that man has observed it. It is not now due north, but apparently at one time it was so. But, as everyone knows, the sailor nowadays uses the compass.

WHY DOES A COMPASS POINT TO THE NORTH?

As we know, the compass is simply a piece of iron, balanced so that it can move freely, and made of the kind of iron which is sensitive to a magnet. Now, the earth is itself a huge magnet, having a north magnetic pole and a south magnetic pole, the latter of which was discovered by Lieutenant Shackleton on his antarctic expedition. So what we call the north pole of a magnetic needle always points to the north, or, at any rate, to the north magnetic pole, and thus

the sailor can steer his course as well as, or better than, if he went by the North Star or any other star.

The so-called north pole of the magnet should really be called the north-seeking pole, for opposite magnetic poles attract each other, and it is really the south magnetic pole of the compass needle that turns towards the north magnetic pole of the earth.

WHAT DOES MATERIALISM MEAN?

We know the words *matter* and *material*; and the word *materialism*, made from them, though it has many slightly different meanings, always means more or less the belief that matter is the all-important thing, and that mind is of less or no importance. We are all liable to be guilty, even those of us who are on our guard, of making this greatest of mistakes in one way or another; and the external difference between wisdom and folly depends not on how much a man knows, but whether he knows this.

It is materialism to worship the thing rather than what it means, or to care very much about forms and ceremonies, and to forget His words when He said: "For what shall it profit a man, if he shall gain the whole world, and lose his own soul?" or, "What shall a man give in exchange for his soul?" He also said: "The life is more than meat, and the body is more than raiment."

ARE PEOPLE MATERIALISTS TO-DAY?

Certainly, in our days, people are always making the mistake of thinking that it is enough to put notes together to make music, or words together to make poetry; that to have a voice is to be a singer; that a beautiful skin is more important than a beautiful soul; that balls and bats make a ball-player; that the ships, and not the sailors, make a navy; that an industry which brings much gold into the country is well worth while, no matter how much life it destroys; that the question of national exports has only to do with cotton and coal, and not with the sending of our best youth of both sexes to the cities or abroad, and receiving poorer specimens to the heart of the nation. All this is materialism, just like the materialism of the miser who sells his life for gold; and it will surely destroy the greatest nation as it will destroy any individual.

WILL ALL THE PEOPLE IN THE WORLD EVER SPEAK THE SAME LANGUAGE?

The answer is: Probably not. Spoken language differs very much from written language. It is surely certain, however, that some day there will be a common language which everyone will know, and which will be used for the business purposes of writing, and for speeches on occasions when people from different countries are present.

This language, whatever it is, will doubtless be based upon existing forms of speech, but it will certainly have to be a great deal better and simpler than Esperanto, or any of the artificial languages that were invented before it. The useful world language will very likely have as large a proportion of Latin in it as Esperanto has, and probably it will follow English in doing entirely without all the clumsy and unnecessary changes of gender and case and time with which older languages are burdened.

But it is a very different thing to say that all men will ever come to speak the same language. Such a notion allows nothing for invention, for local peculiarities, and for slang, which grows into regular languages in some degree. And the best proof that men will still continue to speak in their own way is to be found in what is now happening to English in the United States of America, in Australia, and South Africa. There we find that the spoken language, still more than the written language, is taking its own shape; and what is spoken is, in time, written—at any rate, in the books that deal with the life of the country. It would really be a great pity if all the poetry, for instance, that is to come were going to be confined to one language, however good.

WHAT MAKES OUR TEETH CHATTER WHEN WE ARE COLD OR FRIGHTENED?

The first thing for us to do is to notice ourselves closely the next time that our teeth chatter, and to see exactly what it is that happens. We may sometimes have the opportunity of noticing what is really the same thing in other parts of our bodies; but for some reason or other the jaw is specially liable to this kind of disturbance, as we see also in the case of the disease called lockjaw or tetanus. Well, what we notice is that the muscles which close the jaw are being thrown into

a quick series of brief little contractions. When they contract the jaw rises, and after the contraction it falls by its own weight; then the next contraction comes, and so makes the chattering, the process being repeated.

When a muscle does this kind of thing, we call the act a spasm. Spasms are of two kinds: either the muscle contracts and stays so, as when the jaw is locked in lockjaw, or the spasm is in a series of little contractions, as when the jaw chatters. The great fact about all spasms, of either kind, is that they are independent of the will. We do not order the muscles to behave in this way, and we cannot stop their so behaving if they choose.

The causes of spasm and cramp, which is one kind of spasm, are very numerous, the only common fact about them all being that they act, apart from the will, upon muscles which really have no business to contract at all, except when the will commands them. Various kinds of emotion or feeling, such as fright, for instance, may cause a spasm. Cold, if not too extreme, appears to excite the ends of the nerves in muscles. A large number of poisons, such as strychnine and the germ which causes lockjaw, also have the power of causing a spasm.

HOW DID MEN FIND THAT THERE IS COAL IN THE EARTH?

The coal-measures, as they are often called, form a layer in the earth's crust which is old and has had many other layers heaped up over it since the giant ferns and other plants that gave us our coal were alive; therefore we do not expect to find coal at or near the surface.

Wind and rain, the action of the sea and other causes, not yet well understood, may rub down and wash away the surface layers in places, and then what is beneath, such as coal, may be revealed. Or sometimes there may be greater and perhaps much more sudden happenings in the earth's crust, due to the action of the heat that is imprisoned beneath it, or to the breakage of a layer owing to the increased weight of the layers above it, or due to the production of heat by means of radium and the other elements which belong to the same group.

In this way there were possibly found certain curious and easily broken black stones which, unlike all other stones, would burn. This may have happened when men were quarrying or cutting a little distance down into the earth for some other purpose. Afterwards, it was discovered how the coal lay.

We have by this time probably discovered most of the places in this country where coal can be obtained, at least for anything at all like its present cost; and when it is finished, we cannot say what is to take its place. Fortunately we have in this country such an enormous amount of water power that we can begin to save our coal.

IF WE SWING A ROPE AND THEN LEAVE IT, WHY DOES IT GO ON SWINGING?

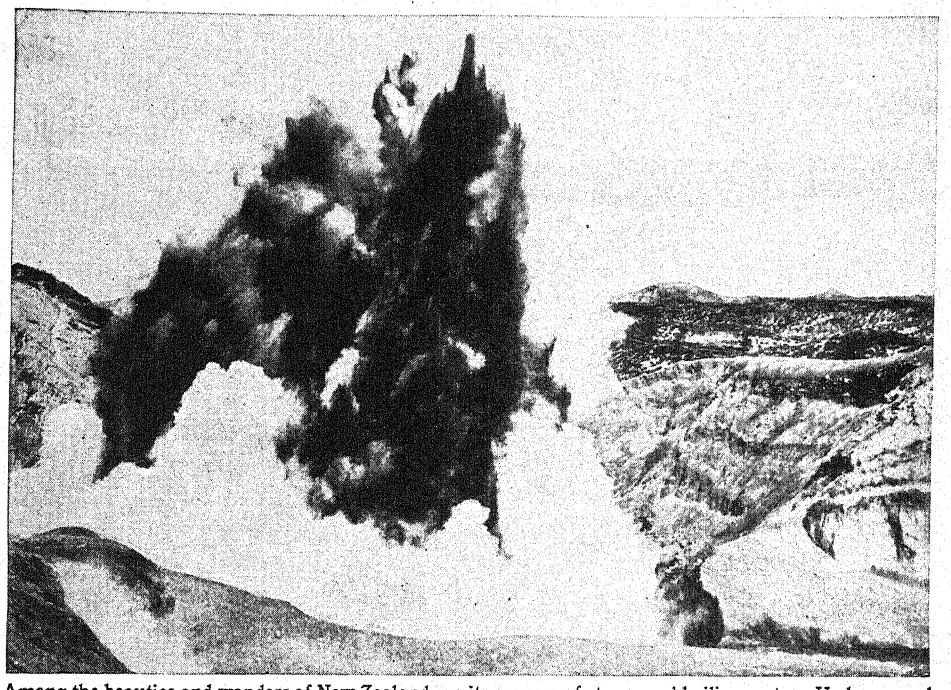
The question really might be put in this form: "Why does the rope *ever stop* swinging?" Let us see why. When we cause a rope to swing, something has happened in our muscles. A store of power, which was derived from our food, and, before that, from the sun, has been turned into motion, which is another form of power.

By catching hold of the rope at this moment we handed the motion made in our muscles over to the rope, and there it is now. Nothing is ever destroyed: and just as the chemist, working with his test-tubes, must account for every atom of matter with which he works, so in this case we must account for every particle of power and motion that is concerned. Therefore we shall naturally expect that the rope will go on swinging for ever. If it stops, the only possible reason must be that it has somehow lost its motion in doing something else.

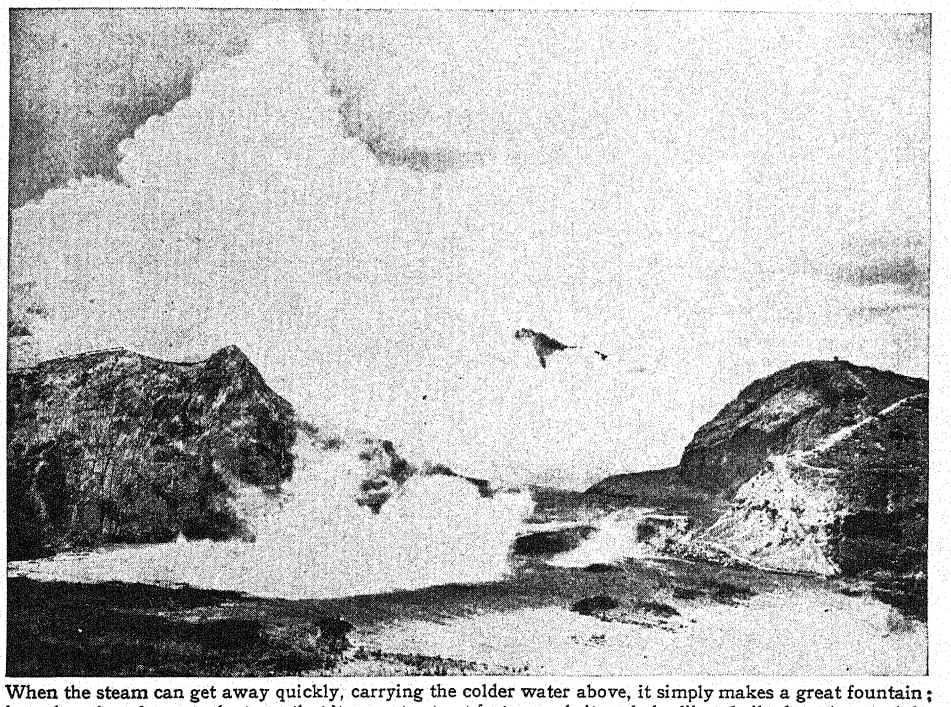
DOES A ROPE STOP AT THE END OF EACH SWING?

It is true that at the end of each swing the rope is still for a moment before it returns, just as a pendulum is. The motion of the rope has been turned into another form of energy—the energy which may be called energy of position, or power to fall; and then the rope, by falling, turns this energy back into motion again. If we could set a rope swinging in a vacum—a space as nearly as possible emptied of air—it would swing for a much longer time. If we could set it going in a perfect vacuum, if it were hung so that no friction was possible, and if none of its motion were used up in doing anything to the shape and struc-

MIGHTY FOUNTAINS OF BOILING WATER



Among the beauties and wonders of New Zealand are its geysers of steam and boiling water. Underground there is great heat from volcanoes. This makes the water so hot that deep down in the earth it turns to steam and explodes, forcing the cooler water above, in brilliant and mighty torrents, high into the air.



When the steam can get away quickly, carrying the colder water above, it simply makes a great fountain; but when there is so much steam that it cannot get out fast enough, it explodes like a boiler bursting, and the result is, as we see in these two pictures of the Waimangu Geyser in New Zealand, most awe-inspiring.

ture of the strands of the rope itself, it would have to swing for ever. It would have no way of spending the motion which it could not destroy. So here is the answer to the previous question which we might have asked if we had remembered the great law that nothing is destroyed.

HOW DOES COLOR GET INTO A BUD BEFORE IT IS OPENED?

We might as well ask why it should not. The sun does not make the color of a flower directly, as if it painted the color on the petals by shining on them! Of course the life, and therefore the colors, of the plant depend upon the sun in the long run, but the color of the petals is not made in any direct way by the sun.

The plant begins in a seed, which is already constructed in a wonderful way that no one has yet been able to understand. Among the thousands of parts of the seed there are some which, though they have no color themselves, are yet able to make the colors proper to the various parts of the plant when the time comes. These things in the seed, which *determine* the future of the plant, are often called *determinants* on account of this fact.

HOW DOES THE SEED MAKE THE COLORS OF A PLANT?

Things called ferments, which may be described as tiny chemists, are probably produced in the seed, and make compounds which it is impossible to make in any other way. The right ferment starts the right process going in each part of the plant, and the final result of it all is the production of a green, a blue, a red, or a white chemical compound.

This happens because it is the nature of the plant. But without nurture the nature of no living thing can realize itself; and the nurture required by the plant when it is developing is much the same as that which it requires when it is grown up, namely, water, salts, light, and air. Light is necessary because light is power, and every chemist, even the ferment in a plant, requires power with which to work. That is why the plant produces early green leaves long before the bud begins to form, so as to be able to catch the rays of sunlight and use them to make the colors of the bud and the very substance of the bud itself.

WHERE DOES THE BREATH THAT WE BREATHE OUT GO?

Fortunately for us, the first thing that happens to the breath we breathe out is that it ascends. It does this because it is, almost always, much warmer than the air it meets, and is therefore lighter, and must rise. This means that when next we breathe in, we have unbreathed air opposite our noses, and not the used-up air we have just breathed out. This difference of temperature is the first thing that decides what happens to expired air, as the proper name for it is; but that is not all. All gases, when exposed to other gases, tend to become mixed with them, until, if nothing interferes, all the various gases are equally distributed. This very important fact about gases is called diffusion.

Expired air has much more carbon dioxide in it, and, as a rule, much more water-vapor, than has ordinary air. These gases, then, at once begin to diffuse into the air around them. But the proportion of oxygen is much higher in the air generally than in expired air, and so oxygen diffuses into it from outside. This process of mixture sounds very simple, but is very remarkable when we come to study it, for the atoms of each particular gas seem to behave as if all the other kinds of gas were not there at all, and act simply according to the number of atoms like themselves that they find around them.

Diffusion is due to the fact that gases are made up of quickly moving atoms, and these travel about to wherever there are few of themselves from wherever there are more, but take no notice of atoms of any other kind.

Another part of this question deals with what happens to the carbon dioxide of expired air. It makes food for plants, which feed on it through the tiny holes in their leaves. So we feed plants and they feed us, which is exactly as it should be.

WHY DOES HEAT CRACK WOOD?

It would be easier to answer this question if more were known about the way in which matter is held together. If we knew why one end of a stick moves when the other end is moved, then we should have something to go upon; but we cannot answer even that question,

though it looks simple enough. There are two distinct problems to solve. One deals with the way in which things not made by life are held together, and the other deals with wood and other things made and built up by life. We know very little of either of these, but we know more about living things than the others. At least we can find something of their structure when we examine them under the microscope; and we can also observe what are some of the effects of heat.

There is a good deal of water in wood. Now, water occupies space, and, like other liquids, will not be squeezed. When wood is heated and the water is driven off, this means that the whole balance of forces holding the wood together must be interfered with. Another reason why wood cracks when heated may be that the heat melts and destroys certain substances which hold the fibres of the wood together.

HOW DO SNAKES MOVE ALONG?

To watch a snake or a serpent gliding smoothly and silently along the ground is to see one of the most marvelous things in natural history. Indeed, one of the wisest men who ever lived confessed that the motion of a snake was one of the



HOW THE SNAKE GLIDES ALONG

things that he could not understand. Three parts of the snake's body take part in its movement—the backbone, the ribs, and the large horny scales underneath. It is by muscles which move these parts in certain ways that the snake glides along.

As a matter of fact, a snake walks on the ends of its ribs—a very curious use for ribs to be put to. These ribs are very numerous, there being one for each part of the backbone. Each rib is also fixed to one of the large belly scales. By the muscles acting on the ribs, these scales are moved forward one after the other, their edges catching the ground, and the result is a slow gliding motion. The usual motion of a snake, however, is most rapid and in this case the body wriggles from side to side, and never up and down, as is sometimes shown in pictures. It is the very flexible backbone that makes this writhing movement possible, and the structure of the backbone also allows of its being broken rather easily.

The gliding movement of a snake is really very like what happens when a boat is being rowed through the water. The ribs correspond to the oars, the ribs gripping the ground by the scales to which they are attached, just as the oars grip the water—only the snake's back is flexible, while a boat is rigid. Therefore, if we watch the snake in motion, we see the movement pass along its whole length in a wavy manner, as each rib on each side moves after the last in rapid succession.

WHY DOES STARCH STIFFEN CLOTHES?

Starch is a very curious chemical compound, with its own way of behaving. Like the proteins—white of egg, and so on—it consists of very large molecules, so large that no one knows how many atoms each one contains. It consists of molecules so big that we can scarcely say that it really dissolves, certainly not as sugar or salt, which have small molecules, dissolve. But it forms a sort of solution with water, and when the water evaporates the starch is left behind.

Starch is one of the substances that are not at all volatile—that is, able to fly off into the air. The big molecules of the starch, left behind in the clothing, form a sort of stiff layer by all holding together. We know how water affects this when we see how our collars grow limp if we perspire.

WHY DO WE NOT LAUGH WHEN WE TICKLE OURSELVES?

This is an exceedingly interesting question, because we cannot think about it without discovering a most important fact about our minds and the way in which they are made for use, for safety, and for the purposes of living. If we do not have this mighty key to mind and body, we shall never understand why it is that the same thing should make us laugh and squirm when someone else

does it, and have no effect at all when we do it ourselves. The whole point and purpose of the feeling in our skins, and of what happens—such as laughing and squirming—when this feeling is aroused in particular ways, is that it gives us information about what is not ourselves, and leads us to protect ourselves.

Our minds have so much power over the way in which our bodies reply to things that when we know the cause of the feeling to be ourselves, and therefore nothing we need concern ourselves about, the body feels no inclination to behave as it does at all other times. The results of tickling are what is called a reflex action, and we learn from this case that a reflex action is a reply to the outside world.

If it is sought to call forth the reply by what we know not to be really the outside world—as when we tickle ourselves—then the body does not trouble. This shows how reflex actions are controlled by and adjusted to the needs of the body as a whole.

DO ANIMALS DREAM AS WE DO?

As we cannot ask animals the answer to this question, we must find it out as best we can by arguing from other facts we know. The case is the same regarding babies and very small children before they can speak. But in all these instances we have quite good reason to believe that dreams occur, just as they occur among ourselves. As soon as children can tell us about themselves we find that they have dreams, and so we naturally expect that they must have dreams of some kind even sooner.

Then, as regards children, and animals too, we know that their brains or senses are made on the same principles as ours in every respect. They are exposed to the same influences as ourselves, and so it would be very curious indeed if the same results, such as dreams, did not follow from what are practically the same causes.

In dreams we have feelings of various kinds, and just as our faces largely express our feelings when we are awake, so they do when we are asleep. If we observe the ways in which such an animal as a dog, for instance, expresses its feelings when awake, we may look out to see whether it ever shows the same sort of expression when it is asleep—perhaps only for a very brief moment, but clearly, nevertheless.

We do find signs in animals which plainly show that they are having feelings of one kind or another—and that means that they are dreaming. Of course, their dreams will differ from ours, just as ours differ. A musician and a painter have very different dreams, and we should expect a dog, in which the smell part of the brain is very important, to dream smells, just as we dream sights and sounds.

IS PHRENOLOGY TRUE?

There is certainly nothing at all absurd in the idea of phrenology, which is that by examining the head we may tell something of the brain, and therefore something about the person to whom the brain belongs.

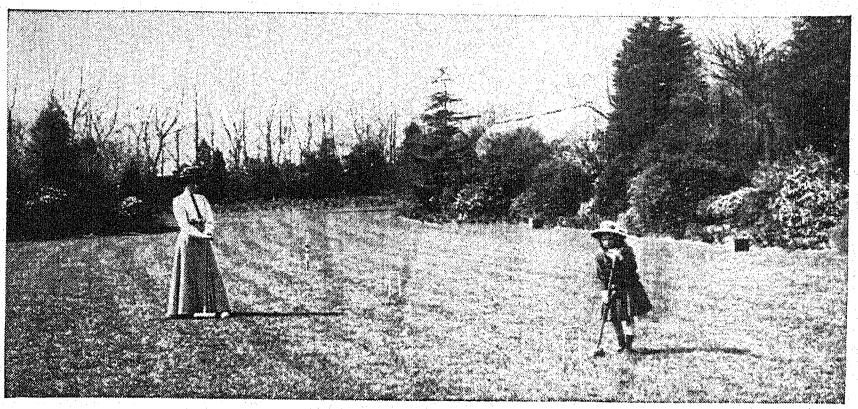
That is one point. But, unfortunately, there is another. The idea is reasonable, but it cannot be used, because the facts of the skull and the brain are against it. To begin with, the shape of the head and the shape of the brain do not much correspond—certainly not to an extent that would be of any use for phrenology. The skull is made of bones built in two sheets, with a space between. This space is in parts very large, and is filled with air or a loose, bony tissue.

This is the way in which the "bumps" are made upon the outside of the skull. Instead of corresponding to the brain, as the phrenologists pretend, they only correspond either to air or loose, bony stuff.

DOES THE SHAPE OF THE BRAIN MEAN ANYTHING?

The fact that the shape of the head does not correspond to the shape of the brain is one fatal objection to phrenology. Another is still more serious. It is that the differences in the mere outside shape, and even in the size and weight, of brains are probably of little or no importance. The differences between brains are of very great importance, but they are to be found only in the grey matter of which the various parts consist, and in the number and shape and arrangement of the cells that compose the grey matter. These differences can be seen only when the brain is finely sliced and thoroughly and carefully examined by the microscope.

THE NEXT QUESTIONS ARE ON PAGE 4583.



THE ENGLISH GAME CROQUET

CONTINUED FROM 4388

EVERYONE knows the game of croquet as it is played in this country. The English game is played in the following manner. Along each of two parallel edges of the lawn we must mark off a length of thirty-five yards, and at right angles along each of the other two parallel edges of the lawn we must measure a length of twenty-eight yards, measuring this off, of course, from each end of the thirty-five-yards line. This will give us a rectangle, or oblong, thirty-five yards long by twenty-eight yards wide. At each of the four corners flags should be placed to mark the boundary.

Having marked out our playing space, we must now fix in the six hoops and two pegs used in the game. The simplest way of doing this is to find the centre of the twenty-eight-yards boundary by measuring fourteen yards along it from either flag, and from this point measure off a distance of seven yards into the playing space at right angles to the boundary. At the end of the seven yards place one of the two pegs—either the white or turning peg, or the colored or winning peg.

Repeat this operation from the centre of the other twenty-eight-yards boundary with the remaining peg. From each peg, still continuing at right angles with the twenty-eight-yards boundaries, measure off another seven yards, and knock in a hoop at each of the two points. This will give us an imaginary centre line like the dotted line in the first diagram, thirty-five yards long, divided into five equal lengths of seven yards.

Starting from the white post and proceeding straight up to the colored post we have: the white post, the first centre hoop, the second centre hoop, and the colored post. We have now to decide the position of the corner hoops. From the white post we must measure off, right and left, a distance of seven yards parallel to the twenty-eight-yards boundary. A hoop must be placed at each of these two points. Then we repeat this from the colored post, and our croquet lawn will be complete.

If a lawn is too small to allow a playing space of thirty-five yards by twenty-eight yards, we should mark off the space as large as the lawn will allow, keeping the proportions of five to four.

Our croquet set consists of four mallets, and each is marked with a colored ring, corresponding to one of the four colors on the winning post.

One of the mallets is marked with blue, the second with red, the third with black, and the fourth with yellow.

Each of the mallets has a ball of a corresponding color; the player using the blue mallet plays with the blue ball, and so on.

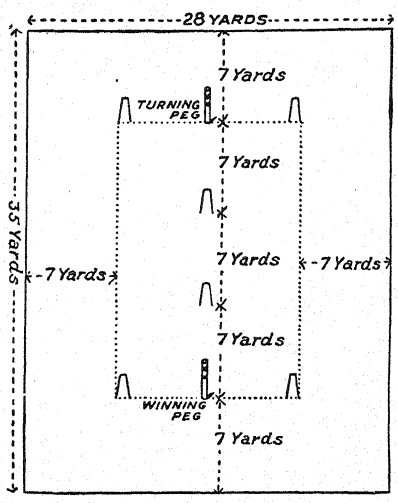
The game is played between two sides, each side, consisting of one or two players, taking alternate turns. That is to say, if there are four players the blue and black mallets shall be partners against the red and yellow mallets. The balls are played in the order marked on the colored or winning post—blue first, red second, black third, yellow fourth. This means that partners never immediately follow each other. Partner and opponent play alternately, and this order must be retained throughout the game. Should there be only two players, one takes the red and yellow balls, and one the blue and black balls, playing the colors in the proper order. Three players may have very good fun by each taking one ball and playing his own game against the other two.

The starting hoop is the one on the left-hand side of the winning peg. In opening the game the player with the blue mallet, who always starts first, plays his ball directly in front of the starting

hoop, a mallet's length from it. He then knocks his ball through the hoop, and is followed in order by the red, black, and yellow balls.

Each player then proceeds as follows: He hits his ball down the field and through the corner hoop directly facing the starting point. He then proceeds at right angles across the field past the white post without hitting it, and through the third corner hoop. Then he hits his ball up the field and through the last corner hoop in line with the winning post.

Through this last corner hoop he proceeds to the middle of the field, through the two centre hoops, and down to the white or turning peg, which he hits. He then starts upon the second half of the course by turning to the left, making for the corner hoop which was the second hoop in the first half of the game. He then proceeds back through the hoop in reverse order to the first hoop, and finishes by coming up to the winning post through the two centre hoops.



1. The croquet ground when laid out for a match, with pegs and hoops in position.

Diagram 2 shows the order of the hoops; the course to the white post being shown by a dotted line, and the course back to the winning post by a continuous line.

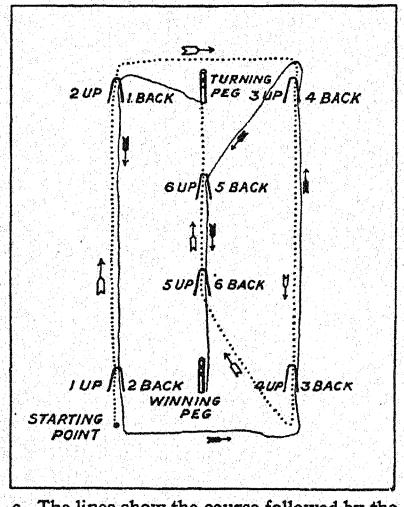
When there are two or four players, the winning side is that which gets both its balls home first. When three are playing, the winner, of course, is the player who hits the winning post first.

This is the bare outline of the game. The fun begins when we actually play, and find out how we can prevent our opponents from getting through or "running" their hoops, and how we can help our partners and assist ourselves at the expense of our opponents. It is this offensive and defensive play which makes the game so fascinating.

We must understand the following rules, however, before we can realize the full possibilities of this entertaining game.

When the player successfully runs his hoop, he is entitled to hit his ball a second time. If in taking this second stroke he hits another ball, this being termed a "roquet," he may "croquet" the ball he hits—that is, he may pick up his own ball, place it in any position touching the ball he has roqueted, and hit both his ball and the roqueted ball in any direction he desires. He then has another stroke, and if he roquets a second ball he may also croquet that, and so with the third ball. No ball must be roqueted twice before the player has made a point—that is, run a hoop or hit a peg. After a third roquet, therefore, the player proceeds down to his hoop or peg. If he fails to run the hoop or hit the peg, his turn is finished. Of course, he only roquets a ball when he thinks it is to his own advantage to do so. He may find it better to roquet no balls at all in some cases, in others to roquet one or two balls, and in others all three balls. If in running a hoop the ball hits another ball, the player who has made the point may at once croquet the ball, his one shot through the hoop counting as a roquet.

Each time the player makes a fresh point, he may roquet all the balls over again, continuing to do so as long as he makes his point regularly after every third roquet. If a player sends his ball beyond the boundary line marked by the flags, he must at once bring it back three feet inside the boundary. A player roqueting a ball beyond this three-feet limit may take his croquet, but if in doing so he sends the croqueted ball beyond the boundary, he forfeits the hit to which he is entitled after a croquet, and his turn is finished.



2. The lines show the course followed by the players from starting point to winning peg.

The roquet may be applied to our own benefit in a number of ways. For example, if our ball has rolled past a hoop without going through, we may still run it in one turn if we can roquet a ball, croquet it up in such a way as to leave our own ball in front of the hoop on the right side of it, so that we can run the hoop with the shot following the croquet.

In the same way we may croquet our partner's ball into position, being careful to remember that it is the croqueted ball and not the croqueting ball which must this time be left in position for running the hoop. If, however, neither our own ball nor that of our partner has run the hoop, it is possible to croquet both our partner's ball and our own into position with the one stroke. We should roquet our opponent away and leave ourselves in position to run a hoop.

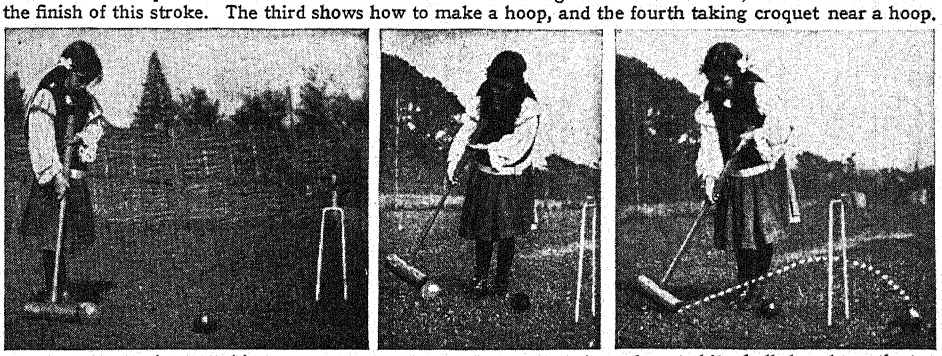
HOW TO PLAY THE GAME OF CROQUET



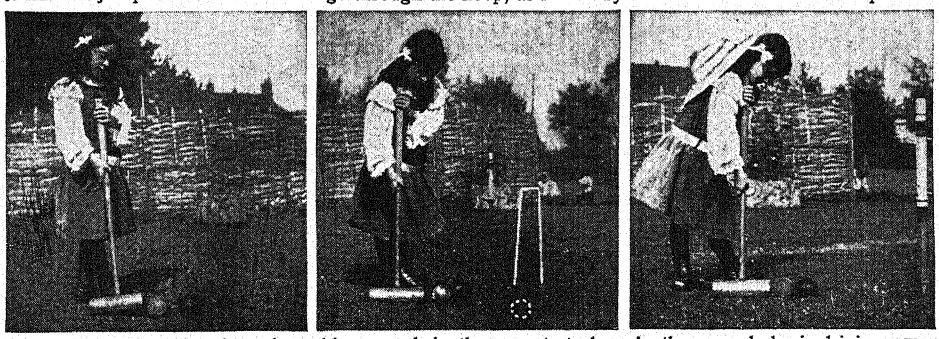
The first picture shows the start, the drive to corner. The second and third pictures show how to make the forearm drive, when it is desired to keep the two balls together and make them travel for a good distance.



The first of these pictures shows how to hold the mallet and swing it for the side stroke, and the second shows the finish of this stroke. The third shows how to make a hoop, and the fourth taking croquet near a hoop.



The first picture shows making a roquet near a hoop. The second shows how to hit a ball sharply on the top to make it jump over another ball to go through the hoop, as shown by the dotted line in the third picture.



In the first picture the player is making a rush in the roquet stroke ; in the second she is driving away the opponent's black ball to the difficult position marked by the black dotted circle and placing her own white ball near the hoop, as shown in the white dotted circle ; the third is pegging out the opponent's ball.

A SALT-WATER AQUARIUM

THERE are few hobbies more interesting than the keeping of an aquarium, and we read on page 1739 how to make and stock a fresh-water aquarium. We should always begin with fresh-water fish and plants, as these are much easier to manage than marine creatures; but when we have had some experience with them, we can go on to form a salt-water aquarium, and certainly we shall find this even more interesting and instructive than the other. The variety is greater, and the fact that we are dealing with creatures and plants that live in the mighty ocean, and the curious form and habits of some of the inmates of a marine aquarium, all lend a vivid interest to the hobby that even the fresh-water aquarium, interesting though it may be, does not possess.

HOW TO GET SEA-WATER

In these days it is easy to get real sea-water, if you live near the coast or in a city where men sell live fish. Of course, the actual sea-water is what we shall find best for our purpose. But it is not an absolute necessity, and if there is any real difficulty, we can make artificial sea-water that will do quite well for the aquarium, and will support marine life as effectively as real sea-water.

We can buy from most druggists sea-salt in little bags, and the druggist will tell us what proportion of the salt is required to a given quantity of water. Or, if it is not easy to obtain the sea-salt ready prepared, we can get the salts separately, and make our sea-water in this way. Dissolve in a gallon of fresh water—spring or rain water for preference—the following substances: Common table-salt, 3½ ounces, and Epsom salts, ¼ ounce, both avoirdupois weight, and chloride of magnesium, 200 grains, and chloride of potassium, 40 grains, both troy weight. There are, of course, other substances in real sea-water, but these form the principal ingredients, and are quite sufficient for our purpose.

RENEWING THE WATER

The water, of course, evaporates, and the very great mistake that many people make is to renew the stock with sea-water. But in the process of evaporation only distilled water is absorbed by the atmosphere, and the various salts are left in the tank. If we fill up the aquarium with salt water from time to time, the result will be not sea-water or its equivalent, but a dense and strong brine which would kill all living things in it. We replace the evaporated water with fresh water, and if we can get clean rain-water, all the better.

In filling the tank in the first place with sea-water, it is necessary to put a mark on the glass to show how far up the water comes, then, in renewing to make up for evaporation, we shall know exactly how much fresh water to pour in, because we should keep up the fluid always at the same level. A strip of stamp-paper, stuck on the tank to mark the height at which the water stood in the first place, will prevent us making mistakes.

SEAWEEDS FOR THE AQUARIUM

Before putting in our marine creatures, we should prepare the aquarium for their reception. When the vessel is ready, we can make in a suitable place a sheltered corner, with stones or pieces of rock, and, after filling with water, we must get some seaweeds, for these help to keep the water sweet and pure. The green varieties of seaweed are the easiest to keep in an aquarium. The way to get them living is to take a chisel and hammer and chip off a suitable piece of rock with the seaweed attached.

The weed known as green leaves is the best. The rock should be placed in position in the gravel at the bottom of the tank, and in a day or two sea-bubbles will be seen round the weed. This is a proof that the seaweed has adapted itself to its new conditions of life. There are many very attractive kinds of seaweed found round our coasts that would look well in an aquarium, but unfortunately they will not live in artificial conditions, and so cannot be considered.

SEA-ANEMONES AS PETS

The most interesting creatures for our marine aquarium are sea-anemones. They may be obtained at quite a cheap price at any naturalist's shop; but, if we live at the seaside, or have a friend there, we may get them from the boatmen or fishermen of the place when we are on a holiday. It is very good fun hunting for them in the rock-pools that are found at so many places on the coast.

Six or seven varieties may easily be kept; but the hardiest of all kinds is that known as the beadlet. They attach themselves to the stones, and appear quite happy in captivity. They seem always hungry, and a small anemone in an aquarium was once seen to swallow a quarter, which cut it in two, whereupon the bottom half of the creature grew a mouth for itself and became a complete anemone, to the great astonishment of the boy who owned the aquarium.

FISH FOR THE MARINE AQUARIUM

A few of the ordinary common periwinkles may be put in the aquarium, with one or two limpets. Shrimps or prawns, too, are very interesting creatures, and they lend a fine touch of brightness to the aquarium, for their eyes glow like phosphorus, and their transparent bodies are daintily tinged with various colors.

But we must not be tempted to put any crabs into our tank, for, interesting though they may seem, they are such brigands that nothing will be safe in the water where they are.

A very common mistake made by beginners with the marine aquarium is the placing of crabs with the other creatures, but the havoc wrought by the crabs soon becomes manifest. Of course, any creatures that die, whether they be anemones, shrimps, or any other, must be removed at once, to save the water from becoming impure, owing to the decomposition of the body, which would soon be fatal to the other inmates.

Owing to the limited space which, of necessity, any private aquarium must furnish, there are not a great number of fish found round our coasts that are suitable for captivity in a tank. We cannot keep anything very large. Young sea-bass and herrings, and quaint sea-robins, do nicely. It is often possible in cities to get small live fish of various interesting sorts at fish-dealers' stores; but one who lives by the sea can get them himself from the tide-pools. The quaintest of all our seaside fishes are the pipe-fishes and sea-horses, which are not scaly, but encased in an armor which is almost bony, and have mouths more like a bird's beak than a fish's lips. As to feeding these creatures, they will eat shrimps or other small sea creatures, and the anemones can be fed upon pieces of meat.

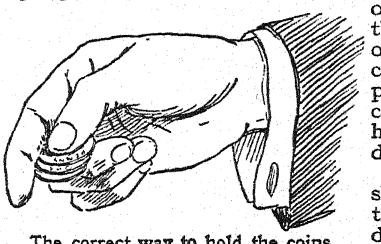
DANGERS OF OVERCROWDING

We must be very careful in starting a marine aquarium not to overstock the tank. Its capacity for fish and other creatures depends, of course, upon its size; but it is far better to have a few inmates than too many. Probably more disappointments occur through the error of overcrowding than through any other mistake that beginners make. All the rules as to cleanliness, keeping from direct sunlight, and other instructions, we may read on page 1739 in connection with the article on the care of goldfish.

CLEVER TRICKS WITH PENNIES

THE "electric penny" is a very remarkable coin, and, skilfully used, will puzzle even persons who think that they know all that there is to be known about conjuring. We shall first describe the effect of the trick for which it was specially designed, and then we shall learn how it is done.

We offer to show a trick with three pennies, but, on searching our pockets, find—or profess to find—that we have one only, so we borrow two more, and lay all three in a row on the table. We pick them up one by one, and hold them, ranged one upon the other, between the thumb and second finger of the right hand, the lower coin projecting a little beyond the middle one, and the middle one beyond the top one, forming "steps," as shown in the picture, so that there can be no doubt that all three are really there. We announce that we are going to pass one of them through the table. Placing the left hand beneath, we drop the three coins, with a quick downward jerk, on the table-top, and bring the hand down flat over them. When we again lift our hand, two coins only are to be seen; and, bringing up the left hand, we produce the third penny from underneath the table.



The correct way to hold the coins.

The secret lies in the peculiar construction of the "electric penny." This is a genuine coin, but "doctored" in a very ingenious way. We need hardly say that there is no "electricity" about it, but it has been cut in half, or nearly half, by a skilled workman, and the two parts have been joined together again with tiny spring hinges made of india-rubber. The two halves may therefore be folded together like the leaves of a book, but the moment the pressure on them is removed they fly open again, and the coin becomes flat as before. The workmanship in the case of a well-made coin is perfect, so that its appearance is unaltered by the cutting, and no one, unless permitted actually to handle it, would perceive that there was anything unusual about it.

Knowing the construction of the coin, we shall now have no difficulty in understanding the working of the trick. When laying the three coins on the table at the outset, we place the prepared penny at the right-hand end of the row.

In picking them up again, we begin at the opposite end. Taking the first coin, we lay it on the second and third fingers of the left hand, the tips of the fingers projecting a little beyond it. On this we lay the second borrowed penny, and on this again our own, with its *smaller* part towards the right hand. We then take, apparently, the three coins in the last-mentioned hand. In reality, however, the moment this hand touches the coins it folds down the smaller half of the prepared coin, and takes only this penny and the next one below it.

The third penny, unknown to the spectators, remains in the left hand, which holds it secure by slightly contracting the fingers on which it lies. When the two coins are dropped on the table, the spring coin resumes its normal appearance; and, as the third coin is already in the left hand, there is not much difficulty in producing it.

The young conjurer should be warned that this trick, though by no means difficult of execution, requires a considerable amount of practice in order to perform it with ease and certainty. On the other hand, it is such a good trick that it is a pity to spoil it by clumsy presentation. The cost of the "electric penny" is a few cents.

An expert in conjuring will find many other ways of using it apart from the trick we have just described. For instance, we may take a piece of cardboard six inches square, and in the centre of it cut a round hole, the size of a quarter. We lay this over the mouth of a tumbler, and say that we shall pass a penny through the hole.

We bring the mechanical penny over the hole in the card, and make a quick downward movement, at the same time folding the coin vertically between the thumb and fingers, when it will pass through and fall into the glass. The moment it has done so it unfolds, and again looks like an ordinary penny.

THE RIGHT WAY TO CLEAN THINGS

THERE is a right way and a wrong way of doing everything. From time to time many things require cleaning; our clothes may become spotted with grease, our fountain-pen may get stopped up, or perhaps we may have been walking in the rain, and so have been splashed with mud. When anything like this requires attention, the best thing is to clean the article without delay. On this page we are told the right way of cleaning several things that are in everyday use, and if we follow the directions given we shall save both time and trouble.

TO CLEAN STAINED CLOTHES

Before being brushed with a clothes-brush, dusty or muddy garments should be well shaken out of doors. It is better to let splashes of mud dry on cloth, and then remove them with a hard brush, always brushing the way of the nap. To rub the splash with a piece of the material itself before applying the brush is a good plan. A grease-spot can sometimes be taken out of cloth or silk with a few drops of eau-de-Cologne or gasolene; and when grease is dried on cotton or woolen material, it may be removed by moistening it with warm water and soaping it. Benzine is also a good grease-remover.

Another method is to place a piece of blotting-paper or porous brown paper over the spot and press a hot iron on it, moving the paper every now and then until the grease is completely absorbed. Black cloth is freshened by sponging with cold tea or ammonia diluted with water. Lay the cloth flat on a table and sponge very carefully, moistening the sponge every now and then, and hang the cloth in the air to dry. Dirt-marks can be removed by rubbing them with rag dipped in gasolene, but this fluid must not be used near a light. Ink-spots can be removed by rubbing with milk or salt. This must be done at once, otherwise the application is of no use. If the ink-spots are old, the best method is to soap them and then lay a little salts of lemon or salts of sorrel on them; but the salts must not be rubbed in, or perhaps a hole may be made in the material.

TO CLEAN TOOLS

Every tool should have its place in the tool-chest, so that its edge is not blunted by knocking against other tools. Fine tools can be rolled up in flannel to keep them bright and free from rust. Any tool can be protected from rust by greasing it; but should rust attack it we must rub it off with emery-paper.

TO CLEAN KNIVES

We can clean a dirty, greasy knife by running the blade into mold slantwise several times and wiping it with newspaper. Table-knives are cleaned in a knife-machine, or by sprinkling emery-powder on a knife-board and rubbing the blade sideways horizontally along this so that the edge of the blade is not blunted.

TO CLEAN A FOUNTAIN-PEN

A fountain-pen is liable to get clogged with dried ink and hairs from the writing-paper and pen-wiper. If the pen has a movable point section, we can unscrew it, and let cold water from the faucet run through it. The pressure of the water is sufficiently strong to cleanse this part, even through a small opening. The barrel will stand a strong pressure of cold water. It is important to keep the india-rubber bulb and glass dropper rinsed out with cold water after "feeding" the pen, otherwise the ink dries in the bulb and spoils it. If our fountain-pen is a self-filling one, we can clean it properly by filling it with cold water several times and then emptying it.

TO CLEAN PAINT

Dirty painted wood should be first dusted with a dry cloth, and then washed with a soaped one. Very hot water and a hard brush spoils the paint and takes it off. We must then rinse the surface with clean water, and dry with a soft cloth.

We can remove paint from brushes by dipping them in linseed oil or turpentine, and washing them in soap and water in the palm of the hand. The soap must be rinsed out in fresh water, and the bristles shaped to a point before being stood upright to dry.

TO CLEAN DIRTY WET SHOES

If the shoes are very muddy, the mud can be wiped off with a damp cloth; cakes of it may be removed with a knife, but this needs skilful doing, lest the leather be accidentally cut. Wet shoes should not be dried before a fierce fire, for great heat impoverishes the leather. It is better to place them on their sides in a room or passage where there is a good draught. When dry, any remaining dirt can be brushed off before the shoes are blacked in the usual way for cleaning.

TO CLEAN A BICYCLE

When the bicycle is brought home wet and muddy, we should wipe the spokes and enameled parts with a cloth. Kerosene will clean the chain, and one of the numerous metal polishes will clean the nickeled parts. The chain may be brushed over with graphite or some preparation containing blacklead. Tires must be wiped clean with a wet house-flannel. The best way to clean the bearings is to run kerosene through them until the dirt has been washed out, and then to apply lubricating oil.

TO CLEAN A SPONGE

Sponges are likely to become disagreeable and slimy if used long without being cleaned. This can be done by washing the sponge in ammonia and hot water, and then leaving it for some hours to soak in cold water in which some coarse salt has been dissolved. Soaking in sea-water, its native element, freshens up a sponge. A coarse cloth is better than a sponge for the bath.

TO CLEAN BOTTLES

A glass bottle can be cleaned inside in many different ways. One way is to pour some household ammonia into it, shake it well, empty it, and rinse it clean with warm water. If the neck be wide, small pieces of a raw potato mixed with salt and water can be shaken up in the bottle, or we may use tea-leaves.

DOLLS MADE FROM CLOTHES-PINS

THE common, round clothes-pin is a convenient article to adapt so as to make tiny dolls or figures. The split end serves for legs, and the body and head are all there ready made, so that the work is simple and easy. Then clothes-pins are cheap, so that we can use a good many of them without incurring much expense, and that fact is an important consideration if we have not much pocket-money. If we prefer it, instead of making dolls we may make a small army of soldiers. A clothes-pin will not stand steadily on its legs, so we must therefore provide supports by which our dolls or soldiers may stand upright. These supports may be small pieces of cardboard, or thin wood or cork, about the size of a quarter, as seen in the pictures. A tack or two driven through the support into the bottom of the legs will serve the purpose.

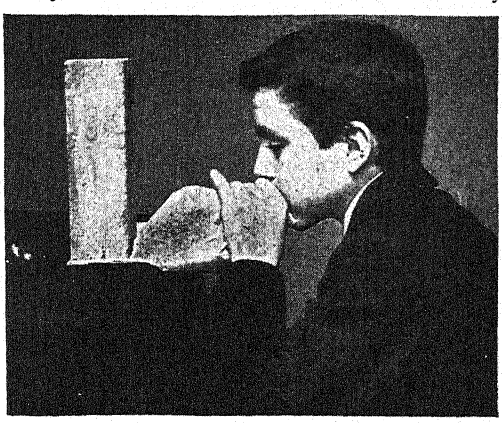


Four little dolls made from clothes-pins.

Then there are many ways in which we can decorate or dress our clothes-pins, so as to make them look realistic. Black ink is the plainest form of decoration we can apply, and the first two pictures show clothes-pins finished in this way. One is a circus clown and the other is a negro with a fool's cap, which is made from a piece of paper twisted into shape. If we wish to give color to some of our dolls, we can easily do so by using our box of paints, and there is room for a display of skill even in such a simple thing as this. If we begin to put dresses on our clothes-pins, tissue-paper is at once the cheapest and easiest material to work. In pictures 3 and 4 we see a man and a woman clothes-pin dressed in tissue-paper. They look quite handsome if the work is neatly done. The man has a tall hat, which is made from a cork stuck upon the head. There are many other varieties of dress that will suggest themselves as we experiment with the pins, and it is always better to devize different styles than to copy something exactly as before. On page 938 we see how to make a pair of wrestlers from two clothes-pins, and, if we have not yet done this, we can do so after we have made a few trials with simpler figures to get used to the work.

BLOWING A BRICK OVER ON A TABLE

SUPPOSE that we put a brick on the table and make it stand up on end, then, simply by using our breath, we try to blow it over. Of course, we shall fail. The idea of blowing a brick over seems ridiculous. But, after all, it may not be so ridiculous as it seems. Indeed, there is a way by which we can make a brick fall over simply by blowing with the mouth. All we have to do is to procure a paper bag of fairly large size, such as fruit-sellers and bakers use to wrap things in; then we set the brick, end up, on the bag near the bottom end, and, after gathering the mouth of the bag together in one hand, we blow into it sharply, as is being done in the picture, when the brick will be blown over on its side.



How the brick is blown over.

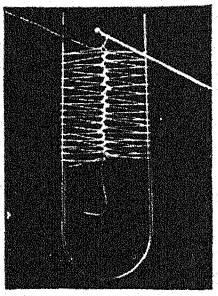
Of course, anything else of convenient shape, such as a large, heavy book, can be blown over in the same way. This trick is very good for an evening party, and it can be performed by a girl or a boy.

We can mystify our friends by placing the brick upon the table and then talking of the wonderful power of the wind, telling of the enormous damage it does in a storm. From this we should lead up gently to the power of the lungs, and then announce that it is possible to blow over the brick upon the table. Our friends will naturally doubt this fact; but we must persuade them to try. When they have tried and failed, we just take a paper bag and show the company present how it is done.

A DOILY MADE OF HAIRPIN WORK

THE lacy-looking doily seen in the picture may appear difficult to work, but it is really quite simple when the secret of making hairpin crochet gimp is understood. The doily shown is indeed a first attempt at hairpin work.

The things necessary for making it are a ball of crochet cotton, size 20, a doily centre, a crochet hook, and two metal hairpin forks, each costing a nickel. A steel crochet hook, size No. 3, should be used. If we do not understand crochet work, we should turn to page 1364.



1. The hairpin fork.

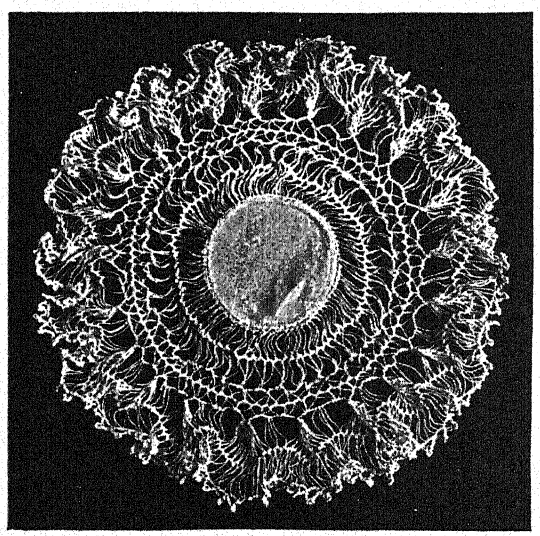
If we intended to do very fine work, we might use a straight wire hairpin; but as it would be unwise to attempt any but fairly coarse gimp at first, we should buy two "hairpin forks," as they are called, one with a span of three-quarters of an inch between the prongs, the other with one and a half inches. The larger one is for making the wide gimp seen in the picture on either side of the narrow gimp, which is made with the smaller hairpin.

First, we set about making the wide gimp. About two inches from the end of the cotton, tie a loop in it three-quarters of an inch long, just half the span of the fork. Then, taking the hairpin in the left hand, prongs upward, we put the loop over the right-hand prong. Now, with the long cotton lying over the fingers of the left hand, we turn the fork round, so that the cotton encircles the left prong. To secure it, so that it forms a loop round that left prong, we take the crochet hook and draw the cotton forwards from behind, through the loop already made on the prong now to the left, and make a chain stitch. Then we lift the handle of the hook over the prong on the right while turning the hairpin.

Next, we make a double stitch through the front part of the loop on the left. After that we turn the hairpin and draw the cotton through the loop in the hook. And we proceed like this: (1) Make a double stitch through the loop on the left—see picture 1. (2) Turn the hairpin while lifting the crochet hook over the prong. (3) Draw the cotton carefully through the loop. We continue in this way, working between the prongs, until the hairpin can hold no more loops, and we have to withdraw it.

We must take care to pick up the last two or three loops on to the prongs again to form a foundation for another hairpinful. The loops should not be so tight as to draw the points of the prongs together, for then the loops of the gimp would get smaller. To judge the quantity of gimp required, we lay it round the doily centre until we find enough has been made for the inner ring, and then fasten off the cotton by drawing it through the last loop and pulling it tight. The doily centre may need a chain of crochet worked round it to make a foundation for the loops of gimp. This was done in the case of the doily that is shown in picture 2. A row of chain is worked round that, each stitch being taken through a loop of the gimp. Some people put a circle of feather-stitch near the edge of the doily centre. It is best to tie and join the centres of the ends of gimp with needle and thread and cut off loose ends.

We next make, on the smaller hairpin, enough gimp to go round the doily. The loops of the two gimps are joined with chain stitch. Two large loops are taken into a chain stitch, then three chain crocheted, then two small loops taken into a stitch, and again three chain stitches follow. This is repeated till all the loops are crocheted in.



2. The doily as it appears when finished.

We shall now want a longer piece of the large gimp to go outside the small one. To this it is joined by crocheting three chain, then twelve chain, each through a loop of the large gimp. These twelve chain are joined into a circle by drawing the cotton through the first of them. We must next make three chain, and follow that by taking two chain through two loops of the small gimp; then three chain, then two chain through two large loops; then three chain, then two chain through two small loops. These same stitches are then repeated until the circle is quite completed.

It will be seen that "doubling back" on the twelfth stitch forms a kind of scallop and gives

fulness like a frill. This part requires special care in counting the number of stitches, as, if not accurate, the scallops are uneven.

At present the outer loops of the large gimp form a looped fringe. To give the doily a neat edging we join the loose loops by crocheting three chain, then a chain through a loop, and repeat this until we come to the dip between the scallops, where the two loops are together on the opposite side of the gimp. At this point we make four chain, each stitch through a loop, then draw the cotton through the first of these four chain to make a small scallop, and proceed three chain and a chain through a loop until the next dip is reached. This we repeat until the loops are used up.

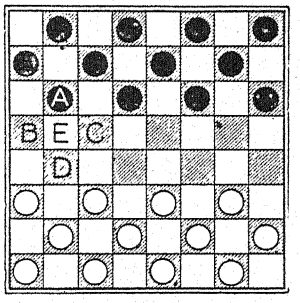
Lastly, to make the points to the edging seen in the picture, we start a chain through the middle stitch of three; make six chain; take a chain through the fourth one back to make the point; make two chain; then make one chain through the middle stitch of the three chain below. This is repeated all round the doily, giving it a durable edge, so that it can be used for a cake-dish, and will stand washing well. With a little ingenuity, pretty designs for embroidery work can be made with hairpin gimp. Treble stitch can be substituted for double stitch, and gives a solid, broad centre to it. This effect is increased by working three treble stitches into each loop.

Wool, macramé twine, silk, in fact, any thread that is generally used for crochet, will make hairpin gimp. Done in peri-lusta the gimp makes a foundation for pretty insertions and laces of various kinds. Bags, purses, shawls, and other articles can be made with hairpin gimp.

HOW TO PLAY DRAUGHTS, OR CHECKERS

THE ordinary game of checkers, unlike most amusements, is so simple that a child can learn to play it, and yet it lends itself to such careful study that men play it almost as they play chess, looking many moves ahead, and making the most wonderful combinations.

The board has 64 squares, 32 of one color, as, for example, white, and 32 of another color, such as black. There are 24 men, disks of wood or bone, 12 white and 12 black. Each player takes one of the sets of men and arranges them as in the first picture, taking care that there is a white square at the bottom right-hand corner of the board before him.

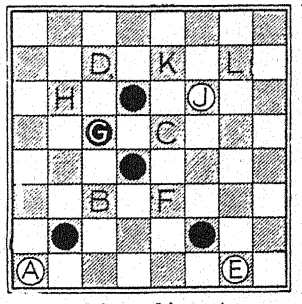


The pieces are placed on the black squares to start with, and are always played on these squares, never being moved on to the white. They are moved diagonally, that is, the man A in the picture will move to B or C, but will not leap across the white square E to D. They move forward, one square at a time, the players taking turns alternately. A man is captured by the opponent's piece leaping over him diagonally into a vacant square beyond, and the captured man is then removed from the board.

If, after leaping across an opponent's man into the next square beyond, we come next to another of our opponent's pieces with a vacant square beyond that, in either direction, we can continue our move and leap over this second piece, taking that as well as the first one. Even more men can be captured at a single move, provided each one has behind him a vacant square into which our piece can be moved.

The second picture, which is a game in course of being played, will explain the moves clearly. We can move from A to B, then to C and then to D at one move, taking three of the black pieces on the way. But from E we could move only to F; we could not go to G because it is occupied by a black piece, and we cannot leap across two pieces together and go to H. When we are not capturing the men, we move only to the next square. The white man J, for instance, in picture 2, can move only to K or L.

As soon as a man has reached one of the four squares at the opposite end of the board, he is crowned, that is, has another checker put on top of him, and becomes a king. He can now move either backwards or forwards on the board. This is a great advantage, and sometimes five or six men may be captured by a king at one move. The object of the game is to take all our opponent's men, or so block them up that they cannot move, then we have won. When an opponent is able to take one of our men, and does not do so, we can either huff him—that is, take from the board the man with which he could have captured our piece—or we can compel him to make this move in preference to the one he has taken. Huffing does not count as our move. The choice of color is decided by lot, and black moves first. In each fresh game we change our men, playing first with black and then with white, and so on. If we touch a man, we must move that man. If we remove one of our own men from the board by mistake, we have to lose it. Usually when only two kings remain on the board a deadlock occurs, and there is no way of either player winning, except by the gross carelessness of the other; therefore, with only two kings on the board, the game is drawn.



MUSIC FROM DRINKING GLASSES

WHEN we consider that music really consists of regular wave movements passing through air or some other medium, it does not surprise us to find that if we can make sound waves vibrate through a substance like glass, we hear a musical note. Musical instruments are played by striking, plucking, rubbing, or blowing; and we can get a musical note out of a tumbler by tapping it or by rubbing it. When we rub the strings of a violin with a bow, we make the strings vibrate; and the vibrations pass off into the air in all directions, some of them reaching the drums inside our ears.

It is possible to see with our eyes how wave movement and sound are connected with each other. If we get a thin goblet or wine-glass and tap it gently with the thumb-nail or with the back of a knife, it gives out a sound that is a clear note, and which we can name by finding another like it on the piano. Now we will place the glass on a table, fill it nearly to the top with water, and hold the stem of it steady with the left hand. Then, if we moisten the second finger of the right hand with water, and rub it steadily round the rim of the glass, we shall find before long that the surface of the water is in commotion, striking the sides of the glass and giving out a clear, bell-like note.

Long ago—some people think it was in the time of the ancient Egyptians, who used to make beautiful glass—someone found out that sweet notes could be obtained in this way from the rim of a glass vessel, and started experimenting. Thus the idea of playing musical glasses arose, and very beautiful music they give. For some 150 years people have enjoyed this music in Europe.

We can collect our own musical glasses; but we must make a diligent search for them, for not every glass has a true note any more than every person has a sweet voice. Ordinary drinking glasses will do, but they must be thin. Two such glasses may be made just alike, but when they are tested, as described above, by tapping with a thumb-nail or with the back of a knife, their pitch, or note, will be found quite different.

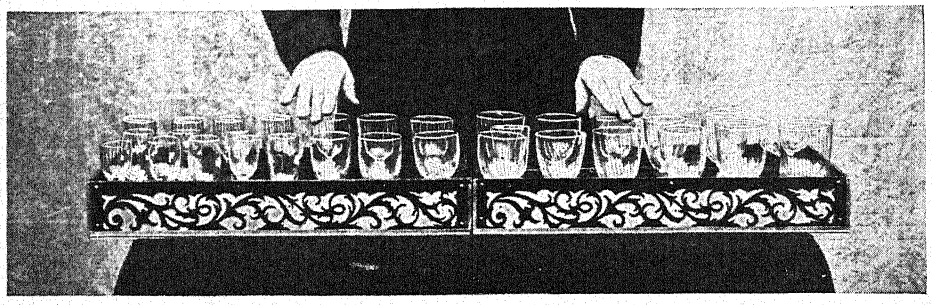
Suppose we want a glass which gives the note F, we shall possibly have to test a dozen or more glasses before we find one that gives a note anywhere near it. But even if it is not quite in tune, a little water poured into the glass will make the note lower, or lower the pitch. The reason for this is, the greater the number of vibrations per second, the higher is the pitch of the note. So we see that the water poured into the glass acts as a sort of brake on the vibrations, which have to move more slowly, and, in consequence, we get a lower note.

If we mean to have a complete set of glasses, we shall need quite thirty-three, or just over two and a half chromatic octaves of tones and semitones. This makes a "manual," such as is seen in the picture, where it will be noticed that the glasses are of different forms and sizes, placed in order in wooden trays, with partitions to steady them. One advantage in playing on glasses is that we can place the notes of the scale in the order we prefer; and though we play with both hands at once, it is more convenient for a left-handed person to be able to place the notes most used under his left hand instead of under his right, as right-handed people have them.

Before attempting to touch the glasses, we must be sure that the fingers are quite clean; and, in order to harden their tips somewhat, and to improve our touch, we may dip them in a glass of water into which a few drops of lemon-juice have been poured. Then we gently and firmly rub the second finger of the right hand round the rims of the glasses in the same direction as the hands of a clock, and test all the glasses, going up the scale. At first the notes will come slowly, but with practice we shall get true, pure notes. Then we may try to pick out a tune. "The Bluebells of Scotland" or "Home, Sweet Home" are found as easily as any. As both hands can play, while one is still touching a glass, we can find the succeeding note with the other hand.

After a time, players become expert in using both hands at once, so that they can employ them in unison or in part harmony. A skilful performer starts one note before the last one has died away, and so makes delightful harmonies. With two or three sets of glasses, it is possible to play duets or trios.

Our musical glasses are very easily tuned, not that they really *need* tuning like a violin or a piano. All we have to do is to add a little water to the glass or else take some away from it, and so raise or lower the pitch.



HOW THE MUSICAL GLASSES ARE TOUCHED SO AS TO PRODUCE A MELODY

A LITTLE VEGETABLE GARDEN

WHAT TO DO AT THE END OF OCTOBER

IF we have not already made the soil suitable to receive any fruit-trees we might think of planting during the autumn, we should do so now. The work of planting can be done late in October or early in November.

We may well take great care with the actual planting of our currant-bushes or gooseberry-bushes, or whatever we may contemplate planting, as upon this depends much of their success. First of all we must bear in mind that the hole must not be too small. It does not need to be very deep, but it should be a *large* hole with a flat bottom, and the soil should have been worked and stirred a good deal deeper than the hole has to be, so that the roots may get to work quickly.

When the hole has been made ready, we take our bush and, holding it upright in the hole, spread out the roots on all sides; if there is not ample room for all these roots to lie outspread quite comfortably, we must widen the hole, as it is the placing of the roots fairly and squarely, as it were, that makes all the difference between good and careless planting.

It is best for one young gardener to hold the bush in position, and for a second one to shovel in the soil about it. This soil needs to be firmly placed about the bush, and to be carefully trodden down, for we have to remember that high winds and sharp, penetrating frosts are before us, and that the soil must therefore be so firm that our bush does not become loosened. To prevent such an occurrence, it will be well to examine the stems of the bushes during the winter from time to time to see that all is as it should be, and especially when a thaw follows a long spell of frost.

Gardeners must always remember that, whatever crop they grow, they are taking the goodness from the soil, and that on this account they must frequently give back to it what has been taken out. We do this when we put manure into the soil, or when we dig in well-decayed leaf-mold. This brings us to an important point. Now that the leaves of the trees are falling, we have at hand valuable material, and on no account should we neglect to sweep up all dead leaves and make them into a great heap.

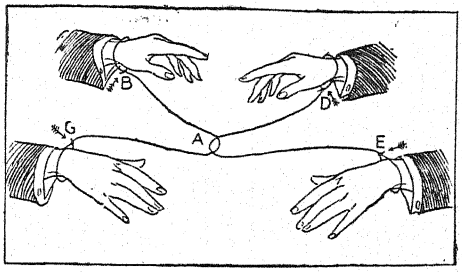
It will take a long time for this heap to decay and become the valuable leaf-mold that proves so useful; but, if we have patience, in time our leaf-mold will be produced, and we can hasten matters somewhat by mixing lime with the leaves and turning them over from time to time.

This is the time to make any alterations in the plan of our little gardens; we may build rock-gardens or make ferneries, and we may make new pathways or new beds and borders.

We may plant rose-trees or fruit-trees, and move our flowering plants. We may plant bulbs. We may lift, with plenty of soil, some plants of parsley, and plant these in a frame for winter use. If we have roses growing in pots, these may still stand out in the open—even up to November—but really tender plants should not be left out of doors after the first of October, though dahlias and gladioli and tuberoses need not be lifted from the soil until a sharp frost comes along and kills their foliage.

TYING TWO PEOPLE TOGETHER

A VERY amusing and perplexing trick may be played at an evening party, in which the only apparatus needed is a piece of string, that should be divided into two parts, each about a yard in length. Two of the guests are asked to come forward, and the pieces of string are tied upon their wrists in the manner shown in the picture, so that they are fastened together. What they have to do is to release themselves from one another without untying the string at any place, and, of course, without slipping the hand through the loop which has been placed around the wrist.



The prisoners tied together by the wrists.

If the two who have been tied together in this way do not know the trick, they will either very soon give it up, or they will get themselves, in a short while, into a helpless tangle. Yet it is quite simple to effect a release under the conditions named when we know the trick.

The secret is as follows: Take the string at the point A, and, making a loop, pass it through the loop on the wrist at B in the direction of the arrow. Then pass it over the hand, and the prisoners will find that they are no longer bound together, but can go free. Of course, the loop at A can be passed through the loop on the wrist at C and over that hand, and the result will be the same. Or, making the loop in the other string, we can pass it through the loops at D or E, and the partners will be loosed. This is a trick the unraveling of which is not confined to the two persons who are tied together. When they have tried to free themselves and failed, or if they know the trick, the other members of the party may be invited to release the partners. When the release has been effected, by reversing the process the prisoners may be joined up again. In trying this trick we must be careful to put the string at A through the loop on any of the wrists in the direction pointed by the arrows, or the release will not be effected.

KEEPING GUINEA-PIGS AS PETS

GUINEA-PIGS are always very interesting pets for boys and girls to keep. The proper name of the clean little pet that we know as the guinea-pig is the cavy. But we seldom speak of cavies, and nearly always of guinea-pigs. It is difficult to understand how the name of guinea-pig came to be applied to the animal. It never at any time came from Guinea, which is in Africa, nor from New Guinea, the large island north of Australia. Also it is singularly unlike a pig. The name may have been taken from Guiana, a country adjacent to Brazil, where some of the animals have been found.

The sort of hutch that serves to keep rabbits will do equally well for guinea-pigs. Their manner of life and the food that appeals to them are very much the same.

Rabbits and guinea-pigs are often kept together and do very well, but we may as well know that the reason some people give for keeping guinea-pigs with rabbits is based on an entirely false impression. It is supposed that guinea-pigs keep rats away from the rabbit-hutch, and many boys know from sad experience that rats do not hesitate to eat very young rabbits if they get the chance. But there is no truth in the belief that guinea-pigs keep rats away.

Guinea-pigs may be purchased from any dealer in animal pets. The price paid for an ordinary short-haired pair is usually about a half dollar, or even less. Fancy guinea-pigs, such as the long-haired Peruvian breed, cost, as a rule, four or five times as much. The hut or hutch in which the pets are to stay should be warm and dry, just as for rabbits, and there should be plenty of warm bedding, such as dry hay, which should be renewed frequently, so as to keep the little house sweet and clean. The animals are very clean themselves, and the hutch should be cleaned out regularly every day. The dishes from which they feed should be washed every morning, and all scraps of food that remain uneaten should be taken away at the same time. They should also be provided with a dish of clean water.

The food of the guinea-pig is similar to that of the rabbit. They eat dandelions and fresh vegetables, roots, such as carrots and turnips, and they like bread and milk. We should give them as much food as they can eat, but if we find that they eat every particle of food that we give them, we may conclude that we have not been giving enough.

Guinea-pigs begin to have young very early, when about two months old. The young ones come in litters of three to five, and one father and mother may have about five litters in a year. It has been calculated that under the most favorable conditions one pair of guinea-pigs might increase to about a thousand in a single year.

When the young guinea-pigs come, they are pretty little creatures, well covered with fur, and with open eyes. They begin to eat the same food as their father and mother the day after they are born, and in about two months they may have young of their own. In winter the hutch with the guinea-pigs should be placed indoors, and care in regard to feeding, and attention in regard to cleaning, should never be slackened.

SOLUTIONS OF THE PUZZLE RHYMES ON PAGE 4385

SOME puzzles are given on page 4385, to which these are the answers.

The word referred to in the first verse is cataract, which is certainly a fine sight when found in the course of a river like the Nile, but is anything but pleasant as a defect of sight. The solution of the next rhyming puzzle is anemone, an *m* on *e*.

Dr. Whewell's strange-looking puzzle can be solved by remembering that O is a cipher. The lines can be read like this:

OH, SIGH FOR NO CIPHER

You sigh for a cipher, O I sigh for you,
Sigh for no cipher, O sigh for me too.
You sigh for a cipher, I decipher so,
I sigh for no cipher, I sigh for you too!

Of the buried names, the animals in the first stanza are: chamois, buffalo, heifer, and leopard; the eight British poets in the next stanza are: Gray, Moore, Byron, Pope, Dryden, Gay, Keats, and Hemans; and the four fruits in the last stanza are: orange, pear, date, and banana. These can all be traced easily.

The solution of the first arithmetical puzzle is written thus: $\frac{9}{6}'' = 16$. Two of the three nines are put upside down. In the next puzzle the answer can be given in rhyme:

Forty-five years I had seen,
When my bride was but fifteen.

This, it will be found, answers the requirements of the puzzle rhyme. In the third arithmetical problem the solution is worked out in this way. The two nines are written thus: IX NINE. Then S, which is a third of SIX, is written at the beginning and at the end, and we have SIX NINES, which is equal to 54. In the next puzzle the ages of the father and son are 42 and 14.

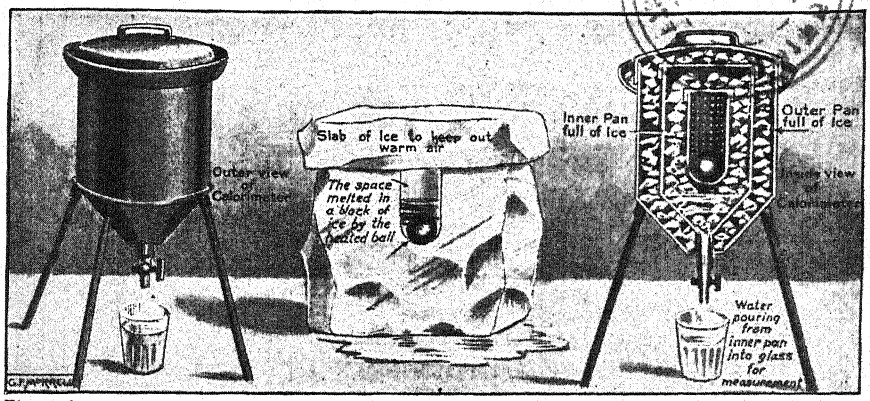
The answer to the first riddle in rhyme is POE, POET, POETRY. The T and TRY are added to the name of the American poet Poe. The thing "often talked of, never seen, ever coming, never been," and so on, is to-morrow.

The solution to the first charade is OX, ox; of the second CO, NUN, DRUM, conundrum; and of the third WEL, COME, welcome.

ANSWERS TO THE CHARACTER GAME ON PAGE 4384

ON page 4384 are some descriptions of well-known characters who are mentioned in THE BOOK OF KNOWLEDGE, and we have to guess their names from the descriptions given. These are the men and women referred to: 1. St. Francis of Assisi; 2. Oliver Cromwell; 3. Shylock; 4. Joan of Arc; 5. Miss Florence Nightingale; 6. David.

THE NEXT THINGS TO MAKE AND DO ARE ON PAGE 4613.



These pictures show the outside and inside of a simple calorimeter, an instrument that measures the quantity of heat in a thing, as a thermometer measures its level of heat or temperature. The amount of heat is shown by the quantity of ice melted. The middle one explains how the instrument works.

HEAT AND TEMPERATURE

CONTINUED FROM 4395



THERE are very many important facts for us to learn about heat. The principal thing we have to understand is the difference between heat and temperature. The word thermometer means heat-measurer, although the thermometer does not measure the amount of heat, but only its level, just as one might measure the height of the water in something, and say it stood at such a level, without asking whether it was in a well or in the ocean. In such a case we do not concern ourselves with the amount of water; neither does the thermometer concern itself with the amount of heat. We shall see shortly how the amount of heat can really be measured, but the way to lead up to that is to study what is called *latent heat.*

The general rule is that when heat is given to a certain quantity of anything, or taken from it, its temperature changes. We might expect that this would always happen—that we could not add heat to a thing without making it hotter, or take heat from a thing without making it colder.

Yet it can very easily be proved that such is possible, and also that it does not contradict in the least the law that no kind of energy can be lost, and that all must be accounted for. If we take ice at the melting-point, and add heat to it, we do not raise its temperature; or if we take water at the freezing-point, with ever so small a piece of ice in it, we can take heat from it, and yet its temperature does not fall; or if we take a mixture of ice and water, we can add heat to it, or take heat from it, without altering its temperature. Lastly, if we take liquid water at the boiling-point in the open air, and add any amount of heat to it, not too rapidly, we make it no hotter. The liquid water disappears, and takes the form of water-vapor, which is itself no hotter than the liquid water was.

All these are illustrations of what is called latent heat. What is true of water is true of other things. Now, what we notice in every one of these illustrations is that though the temperature of the water is not changed, its state is. In one case we have ice turning into liquid water; in another, liquid water turning into ice; in another, liquid water turning into water-vapor.

Here is the proper definition of latent heat, and, though it is rather long, it is perfectly clear: "Latent heat is the quantity of heat which must be communicated to a body in

a given state in order to convert it into another state without changing its temperature." That is exactly what these examples illustrate. The heat seems to have disappeared as heat when we put it into ice and turn the ice into liquid water no hotter than the ice was, and so we say that it has become *latent*, which is a Latin word that means "lying hid."

The opposite term to latent heat is *sensible heat*. Here the word sensible is used in its proper meaning, and a thing is called sensible because it can be sensed, or felt. So, when we give heat to a thing and make it warmer, we call it sensible; but if we give heat to a thing and make it no warmer, we say that the heat becomes latent. We must clearly understand from the first that if the heat does not make the thing warmer, then it must change the state of the thing; the heat has to be accounted for in any case. We may quote the simple language in which Lord Kelvin —the great master of this subject, and such a master that he could write about it in simple words—explains to us the right meaning of the words sensible and latent heat.

THE HEAT THAT CAN BE FELT AND THE HEAT THAT CANNOT BE FELT

"Thus, when heat given to a quantity of water warms it, the heat becomes sensible to a hand held in the water. When a basin of warm water and a basin of water and ice are placed side by side, a hand dipped first in one and then in the other perceives the heat. If now the warm water be poured into the basin of ice and water, and stirred for a few seconds of time—unless there is enough of warm water to melt all the ice—the hand perceives no warmth; on the contrary, it perceives that the temperature is the same as it was in the basin of ice and water at the beginning. Thus the heat which was sensible in the basin of warm water has ceased to be sensible in the water that was in that basin, and has not become sensible in the other. It is therefore well said to have become latent."

The facts of latent heat give us a means of measuring heat itself, for we can measure the amount of ice that can be melted into water without change of temperature, and the more ice that is so melted, the more the heat that is employed. It does not matter in what form the heat is applied; we can measure it equally well. A given quantity of ice may be melted into water of the same temperature, either by being exposed to a great deal of warmish water or to a little very hot water. But we know that in each case the amount of heat there must have been the same, because it does the same work, turning the same amount of ice into ice-cold water.

THE AMOUNT OF HEAT IN A THING IS NOT THE SAME AS ITS TEMPERATURE

The old name for heat when it was supposed to be a fluid was *caloric*, and the name for the instrument that measures heat is *calorimeter*. We must never mistake the absolute difference between a calorimeter and a thermometer; the one measures the quantity of heat, and the other measures its level.

We are, nowadays, accustomed to call a fixed quantity of heat a caloric, and that will help us to remember the word calorimeter. Of course, in ordinary language we have the word heat for both purposes. When we say latent heat, we mean heat itself; when we talk of summer heat, we do not really mean heat itself, but temperature, or heat-level.

Two great and famous Frenchmen, Laplace, the great astronomer, and Lavoisier, the chemist, whose splendid head was cut off at the Revolution, invented the first calorimeter, which measured the amount of heat by the amount of ice melted. We see a picture of this instrument on page 4501. Another method might be employed. When ice is turned into ice-cold water, heat becomes latent; but heat becomes latent also when boiling water is turned into water-vapor, and so it is possible to make a calorimeter that depends on measuring the amount of water evaporated by heat.

HOW TO MEASURE THE AMOUNT OF HEAT IN ANYTHING

We can also measure the amount of heat, without any reference to latent heat at all, by taking water or some other substance at a fixed temperature, and noticing how much a given quantity of it has its temperature raised.

When we come to consider the doctrine of latent heat in the light of our modern knowledge of matter, we see

that, though the term is worth keeping, it is rather misleading. The truth is that when ice is turned into ice-cold water by putting heat into it, the heat which disappears is really turned into something else—something else that makes the difference between liquid water and ice. This something else is the motion of the molecules of the liquid water; and what has really happened is that the heat motion has become turned into that motion upon which the liquidness of the liquid water depends.

In the same way, when boiling water is turned into water-vapor of the same temperature by having heat added to it, and when we say that the heat has become latent, what we really mean is that the heat motion has been turned into another kind of motion—the motion of the molecules making up water-vapor. We know that all gases, including water-vapor, consist of molecules in very rapid movement. Part of this we must suppose to be the special kind of movement called heat, and of this there may be less or more, because a gas may be hotter or colder.

How heat motion changes into the motion that makes steam

But when liquid water is turned into water-vapor of the same temperature, there is really no more heat motion in it, but the heat put into it has been turned into motion of another kind—that kind upon which depends the difference between water and water-vapor. Yet we may still retain the term latent heat, as Lord Kelvin has shown us, and in all such cases as this we shall find, if we go the right way about it, that we can get back again from the substance the heat we have put into it, while it loses that special kind of motion in which the heat we put into it has been "lying hid."

Now, there is another very important phrase, *specific heat*, which we must study. If we take a given quantity of water and a given quantity of something else, both at the same temperature, and put a certain amount of heat into them, we find that the something else, whatever it is, becomes hotter than the water does. The only exception to this rule is hydrogen gas. Apart from that, it is true that, in order to make water hotter, we require to put into it more heat than into any other substance. We have to study, in the case of every substance, its behaviour in this respect, and so we learn what we call its specific heat. For convenience, we call the specific heat of water 1, and then the specific heat of all other substances, except hydrogen gas, is less than 1.

Why the same amount of heat makes one thing hotter than another

The chemists have discovered certain very remarkable laws about the specific heat of different things. It is not a matter of random chance that the same amount of heat given to the same amount of copper and iron, at the same temperature, will not raise the temperature of each of them in equal degree.

We find that there is a law in this matter, and the specific heat of a substance depends, to a great extent, upon the size and weight of the atoms of the substance. If an element has very big and heavy atoms, there will be fewer of them required to make up the given weight of that thing—say, an ounce—than will be required to make up the same weight of another element which has smaller and lighter atoms. The fewer the number of atoms, the more heat will there be, so to speak, for each of them; and so the bigger its atoms are, the more the temperature of a thing will be raised by a given amount of heat.

In other words, the bigger its atoms are, the less heat will be required to raise its temperature to a given degree. The proper way of saying this is that, as a rule, the specific heat of a thing is "inversely proportional to its atomic weight." This celebrated law is rather difficult to get hold of when first we hear it, but it applies so widely, and has such an important explanation, that we must try to understand it.

The reason why the tea-pot keeps hot so long

The very high specific heat of water has important consequences in practical life, and this is, indeed, one of the most valuable properties of this wonderful compound. If we made tea with any other liquid than water, or if we put any other liquid than water into a hot-water bottle, we should find that the tea or the hot-water bottle got cold far more quickly than usual. The fact that water has such a high specific heat

means that it will hold a lot of heat, so to speak. The amount of heat in a given quantity of boiling water is greater than that in the same quantity of anything else at the same temperature, just because its specific heat is higher. This means that if we wish to boil cold water, we have to put more heat into it than we should have to put into anything else, and it also means that when we have got the water boiled, there is a great deal of heat there, and so it takes a long time for the hot water to cool.

THE HEAT STORED UP FOR US BY WATER

All this means that water is a great storer of heat, and this fact is equally true of a full tea-pot, or a full hot-water bottle, or of the ocean round our shores. We now see more clearly than before the key to the great virtues of island climates compared with inland. The water around the islands could not do what it does if it were not for this high specific heat of water combined with its great conducting power.

This means that, in the summer, water can swallow up enormous quantities of heat, quite out of proportion, so to speak, to the extent to which it is made hotter. Nothing else could swallow up so much heat except by turning it into latent heat and becoming gaseous. These enormous stores of heat that are collected in the summer can be given back to moderate the climate in the winter; and yet the sea, though giving up such great stores of heat, is not cooled so much that it is compelled to freeze.

This must conclude our study of heat. It is a subject about which too much cannot be known, because of its immense practical importance in relation to all kinds of machinery, and the using of power for the purposes of human life; and it is a subject about which too much cannot be known, also, because of its great bearings on our ideas of the universe, and the history and destiny of things in general.

THE IMPORTANCE OF THE LAWS OF HEAT TO ALL KINDS OF MEN

There is, perhaps, no other subject in the world which so directly concerns the man who wishes to save a penny in the dollar in the working of his factory or his motor-car, or the pure philosopher who wants to know the laws and course of Nature. That is why one of the greatest of all the achievements of the nineteenth century was the discovery of the nature and laws of heat, unknown to, and misunderstood by, all preceding ages.

The discovery of these laws is of enormous daily importance to every one of us now, and it furnishes the proof of that greatest of all scientific ideas, to which science is continually bound to refer—the truth that while all things can be changed into other things, while all forms of power, such as heat, can be changed into other forms of power, yet nothing is made out of nothing, nor is anything ever destroyed. This greatest of all scientific truths, the law of the conservation of energy, was seen, as by the eye of a prophet, by the earliest thinker of whom we have any record, and has played a part in the history of the human mind for 2,500 years.

But the proof of it was not obtained until the nineteenth century after Christ, and we owe that proof to the great men in Germany and to the great Lord Kelvin, who found, in their study of the laws of heat, the fixed and eternal relations which obtained between heat and other forms of power.

THE DISCOVERY THAT HEAT AND ENERGY CAN NEVER BE LOST

We have seen that heat is not a thing in the same sense that a chair is a thing, as was once supposed to be the case, but that it is really a form of motion. The discovery that this form of motion can be changed into other forms, and that the change, in either direction, proceeds so that nothing is lost or made, was absolutely necessary if the great idea of the conservation of energy was to be proved. The fact of the equivalence, or equal value, of heat and work is now proved.

Equally important is the discovery that heat is produced by chemical changes, as in a fire, or that, in other chemical changes, heat is used up and disappears. In these cases, also, it is possible to account strictly for all the heat that seems to be made or seems to be lost. Such instances, therefore, are only a few additional proofs of the fact that in Nature it is quite impossible for anything ever to be lost.

THE NEXT PART OF THIS IS ON PAGE 4579.



Lake Titicaca, the largest lake in South America, is situated over 12,000 feet high in the Andes.

SOUTH AMERICA AND ITS CONQUERORS

CONTINUED FROM 4407



LLAMA

BEFORE we commence to read the story of South America, let us for a moment look at the map. If we study it for a little, it will add greatly to our interest, for the geography of the continent has had a great deal to do with its history.

The first thing that strikes us is the strange likeness between the southern continent and our own continent of North America. Both have the same triangular shape, both have high ranges of mountains along the western coast, both have mountains in the east and a great central plain. It is believed by geologists that more than once this central plain sank beneath the ocean, and only the mountains of Brazil and of Guiana and part of the Andes rose above the water. How many thousands or millions of years the waves of the Atlantic washed the mountains we do not know. Then the land slowly rose again, the Andes pushed their way high up toward the clouds; the low land was slowly drained, and luxurious vegetation sprang up and covered the plains.

In the northern part of the continent the Andes are divided into three distinct ranges, with high valleys between. Further south they form but two chains, or cordilleras, with a central valley, and in the extreme south they consist of one range, which ends abruptly at the southern end of the island of Tierra del Fuego. The mountains are nowhere more than fifty miles from the coast, and in fact on a clear day they are distinctly visible from the deck of a coastwise steamer. As you may read elsewhere, for over two thousand miles practically no rain falls in between the mountains and the sea. The sides of the Andes, which are the youngest mountains in the world, are very steep. Consequently the western rivers are very rapid. When the snow melts, the water rushes down in torrents to be lost in the sand or the sea, and in a short time many of the river beds are dry. In the rainless region, long stretches of the coast land are desert; and only where irrigation is possible is any vegetation to be seen except along the river beds in springtime.

Most of the rivers which rise on the eastern side of the coast range flow through the fertile mountain valleys, break their way through the eastern mountains and find their way to the

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Atlantic. Therefore the valleys of the Andes and the eastern plains are well watered. The rivers have brought down enormous quantities of stuff from the mountains and deposited it on the plains, and consequently the plains are very fertile. The northern plain, especially along the great river Amazon, is covered with a thick forest of tropical trees; but the plain of Argentina is almost treeless.

When the Spanish conquerors reached South America, the country was inhabited by people whom they called Indians, and to whom the name of Indian has clung to this day. In the northern islands and on the northern coast the adventurers found the fierce and cruel Caribs, and the gentle Arawaks, whom the Caribs hated. In the highlands of Brazil the Portuguese found the Tupayas, whom the other Indians called the "ancient ones," while south of the Amazon, the great plains as far as the River Paraguay were inhabited by the Tupis. In the country that is now Paraguay and Argentina were found a people who called themselves Guaranies, and who some people say were part of the Tupi race, while others say they were a separate people. Further south toward the southern end of the continent were the Patagonians, a very tall people who called themselves the Tehuelches, and in the Archipelago of Tierra del Fuego lived a people who were even more primitive than all the others. These races were divided into many tribes, of which we shall not ask you even to try to remember the names.

Of all the people of whom we have been speaking, the most civilized were the Arawaks. They cultivated corn, and knew how to press the poisonous juices out of the root of the cassava, or manioc, to produce the substance that we know as tapioca, from which they made bread. They were good fishermen and knew how to make canoes, and to use them skilfully; but there their civilization stopped. They had no need of warm clothing, or of walled houses to keep out the cold, and they had not learned to weave, or to build anything except rough shelters.

The Tupayas never learned to cultivate the ground, and neither did the Patagonians, but the Patagonians, who lived in a cold climate, clothed themselves in the skins of the animals which they killed for food. All these people used bows and arrows in the chase, and weapons and implements made of stone.

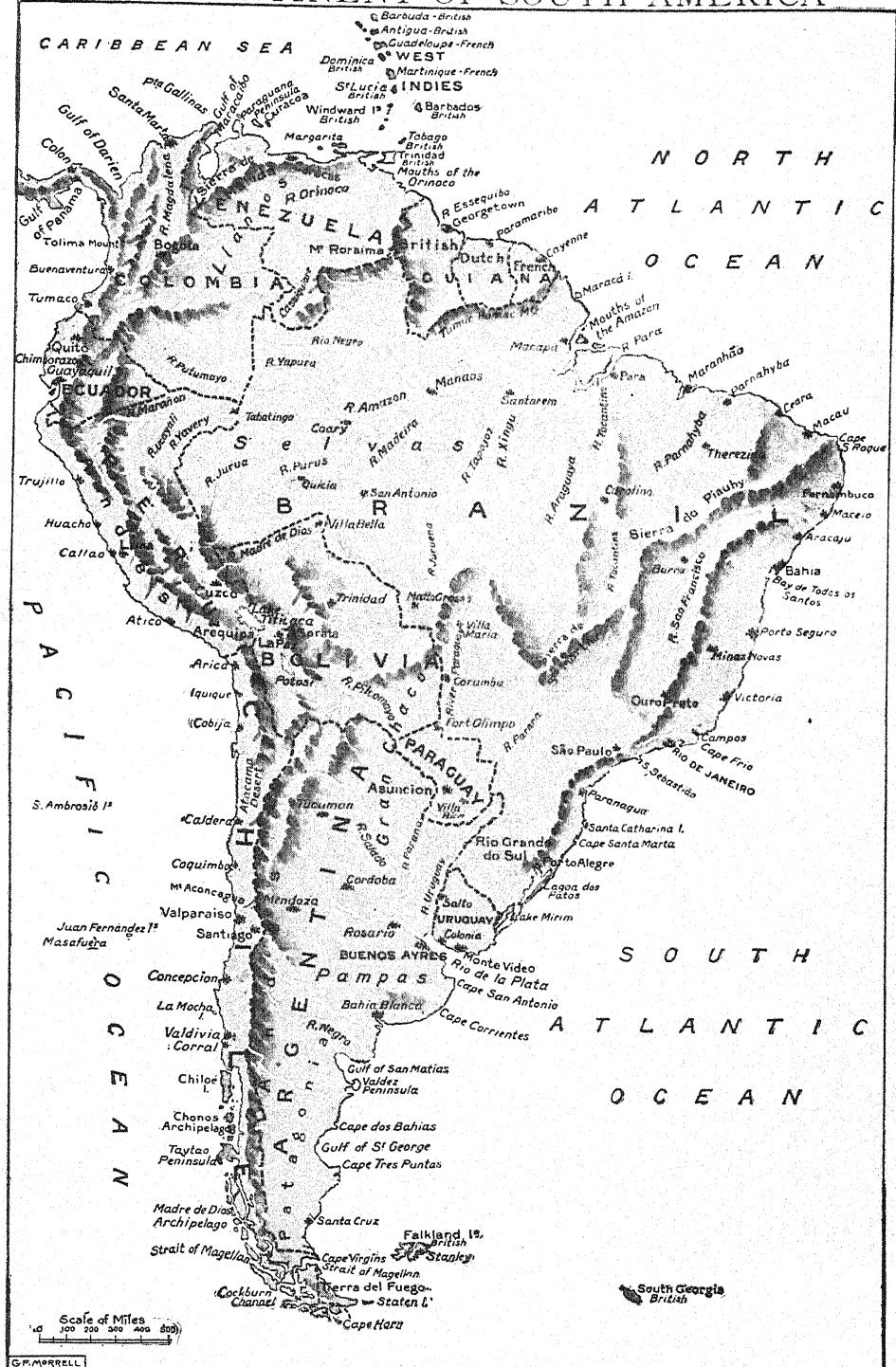
It is interesting to know something about their lives, for the stone age still continued to exist for them and they show us how our own savage forefathers lived long ago. Besides many of their descendants continue to live in much the same way. As you may see from the map, much of the country lies within the tropics. Life down there is so easy that they have never had to learn to think, and consequently they have never become anything but grown-up children.

The people who lived in the mountain regions of the west also used stone weapons, but they had reached a much higher stage of civilization, and the stories of the Araucanians, the Chibchas and the Empire of Peru read like a strange romance.

THE ARAUCANIANS, WHOM THE SPANIARDS COULD NOT SUBDUE

Down in the southern part of the continent, where the Andes divide into two ranges, the Araucanians lived in the long central plain between the mountains. They knew something of agriculture, but supported themselves chiefly by hunting, and they are now almost a nomadic people. Nevertheless, when the Spaniards first met them, they already had a settled form of government by chiefs and princes. Their territory was divided into four independent sections, which for the sake of convenience we may call principalities, the chiefs of which were called toques. Each of the principalities was divided into five provinces, and each province was again subdivided into nine districts. The chieftainship of all these divisions was hereditary, each chief being succeeded by his eldest son. It is said that assemblies of the chiefs were held every year, and that the decisions which they made were submitted to the people of the tribes for approval. Up in the north of the continent, where the Andes break into a number of ranges, the Chibchas had already learned how to weave, how to build houses and to till the ground. They cultivated maize and potatoes and watered their fields by a good system of irrigation. The territory in which they lived was divided into five states, which were governed by chiefs called caciques. The people worshiped the sun and the moon, and as they believed that the caciques were descended from

THE CONTINENT OF SOUTH AMERICA



The continent of South America contains more than seven and a half millions of square miles, and the whole of this vast expanse of the earth's surface was at one time divided between Spain and Portugal. The long line of the Andes Mountains runs from north to south, like a great dividing wall between east and west.

the sun, they paid them great honor. They believed in other gods also, and thought that these gods were pleased with human sacrifices. The lakes, they thought, were the abodes of the gods, and offerings of gold and jewels were thrown into them, or buried on the shore.

How the Empire of the Incas Began

The cool, well-watered valleys of Peru were the home of a civilization that has been a wonder of the world since it was first brought by the Spaniards to the attention of Europeans. Its history may have gone back many hundreds of years, but all we know with certainty is told in traditions handed down from a few centuries before Spanish times. Perhaps a little later than the Norman Conquest of England, these valleys were conquered by a neighboring people, who settled there, formed a confederacy of tribes under a prince called the Inca, and built the city of Cuzco. They lived in peace for some centuries before some southern tribes, called the Chancas, looked on the valleys with envious eyes and advanced to conquer them. The Inca, who was aged, ran away, followed by most of his people. But his young son Cusi, aided by two aged generals and a few of the chiefs, gathered together a small force of seven hundred men. By skilful use of his little army, Cusi contrived to throw the enemy into confusion. When they saw what he had done, other chiefs, who were watching from the hills, came to his aid, and the Çhanca chiefs were utterly routed. Then followed a war in which the Chanca tribes were conquered, and their land added to the Inca's territories, and Cusi was made Inca with the name of Pachacuti. Conquest usually leads to conquest. Pachacuti and his successors subdued tribe after tribe, until, at the time of the Spanish discovery, the Empire of Peru stretched from the land of the Chibchas in the north, to the land of the Araucanians in the south. Its western boundary was the Pacific Ocean, and on the east it extended in some places down to the forests on the great eastern plain. This empire had one of the most remarkable governments that the world has ever seen. All the conquered people belonged to the same race and had the same ideas, the same habits of thought and ways of life. Their various dialects were derived from the same language, and most of them had traditions which pointed back to the same ancestors. The Inca Pachacuti, who was the greatest man ever produced by the native American people, worked upon these materials with the skill of a great statesman, and his example was followed by the men who came after him.

No attempt was made to overthrow the customs of the conquered tribes, and the empire was built up on the idea of the village community. No one owned any property; everything belonged to the state. Marriages were arranged by the officers of the state, together with the housing, food and clothing, the games, festivals and work of the people.

Men and women of sixty had no work to do; those from fifty to sixty did only a little light work. Most of the labor was performed by men and women from twenty-five to fifty. Youths worked in the field picking coca, and children did light work at harvest time. The people were arranged in communities of a hundred families, called pachecas. Over each pacheca was an officer called a llacta-camayoc, and ten pachecas formed a huaranaca, governed by a chief chosen from the llacta-camayocs. Each valley comprised a district called a hunu, presided over by a curaca or judge. Over all, an imperial officer and staff watched every detail of the administration. Inspectors from the capital examined and reported upon the state of affairs in each district, arranged the marriages, and selected those worthy of helping in the government.

From one point of view the system was the most perfect form of government realized on earth. Nobody in the empire was poor or idle. The noble class had the hardest training, and were exposed to greatest danger; the laboring class were better off than millions of persons are in our own country. Everything in the empire was splendidly organized.

For instance, the Peruvian Indians were very fond of plays, and the state encouraged scholars to write fine dramas for the people. One of these, composed in the fifteenth century, has come down to us in the Inca language. It is a beautiful, vivid, and exciting play, equal to anything that had appeared in modern Europe at the time it was composed. They had made some progress in science and engineering.

THE PEOPLE OF SOUTH AMERICA



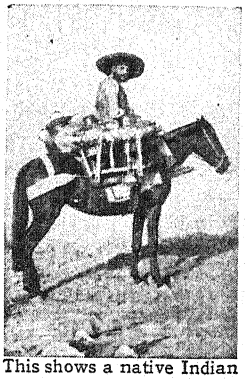
An Indian of Cuzco, the ancient capital of the Incas, going home with a bundle of fuel which he has gathered.



Indians of the Titicaca region of Bolivia dressed in strange costumes ready to perform a native dance on a festival. These dresses were intended to frighten away evil spirits.



An Indian woman of La Paz, in Uruguay. This is the way in which the women of those parts carry young children.



This shows a native Indian milkman of Brazil. In the rural parts the milkmen ride about on horseback.



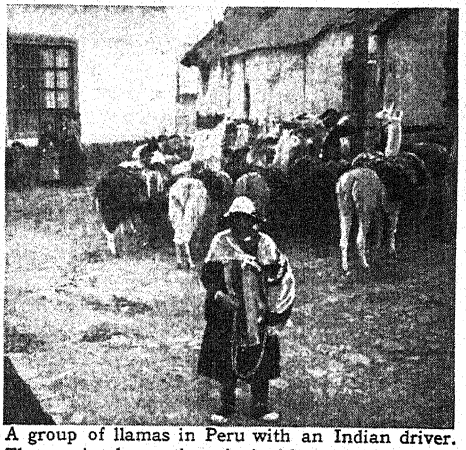
The Patagonians, though very muscular and able to walk long distances, fall easy victims to disease. They are one of the tallest races on the earth. Here we see a woman and children wearing skins.



A native of Villa de Cura, a city of Venezuela, that suffered terribly from a great earthquake in 1900.



Botocudo Indians of Brazil, a race that lives in the wilder parts of the country. They have very primitive habits, wear few clothes, and use bows and arrows.



A group of llamas in Peru with an Indian driver. These animals are the principal beasts of burden in the country, and can carry loads a long distance.

The photograph of llamas with their Indian driver, copyright by Underwood & Underwood, N.Y.

They knew how many days made up a year; they knew how to divide the days into months, and could tell the time of the equinoxes with accuracy. They could build roads and bridges, and knew the principle of suspension bridges, and they had a truly wonderful system of irrigation. Steep mountains were terraced high up their sides, and with the aid of water from irrigation channels were brought to a high state of cultivation. The people were good agriculturists, and cultivated maize, potatoes, tomatoes, coca and cacao—our cocoa—besides other plants that are not familiar to us.

THE INCAS NEVER LEARNED TO WRITE

No South American people ever invented an alphabet, and although the Peruvians had a well-developed language, and were able to use it in composing plays and songs and poems, they had no means of writing them down. Their only mode of making records of any kind was an elaborate system of knotted cords, called quipus, but these were only an aid to memory and had to be translated by learned men, called auipucamayos. Still, all things considered, the men of the Inca empire ranked high in intellect.

Until quite lately it was thought that it was the Incas and the tribes to which they belonged who had created the great civilization of the empire. Students now see, however, that this is not so. We know that the beginning of the empire dated back only a few hundred years before the Spanish conquest, and engineers say that it must have taken thousands of years to build up the system of irrigation that exists through the mountain region, and along hundreds of miles of the dry coast region. It is said also that it must have taken many hundreds of years to domesticate the llama, which the Peruvians used as a beast of burden. This was the only domestic animal in South America when the Indians went there.

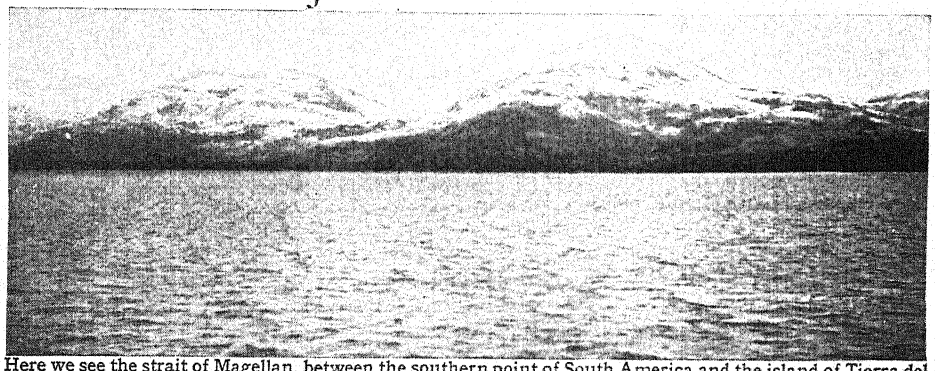
The great work that the Incas had done was to organize the people that they conquered, into an empire. They succeeded in what they attempted, but in their success the seed of failure was planted. They did not recognize that if a state is to remain great, its people must have liberty and freedom, and must have the right, and feel the need to struggle for themselves and all they hold dear. Everything was done for the people. For generations they had been taught to look to the state to supply all their needs. Consequently, when their leaders were taken, they were like sheep without a shepherd. The civilization which the Spaniards sought to impose on them was foreign to their minds, and in the centuries since the conquest, they have sunk into poverty and fallen into a state almost of barbarism.

DISCOVERY OF THE INCAS BY THE SPANISH, AND THEIR CONQUEST

Soon after they had settled themselves on the western coast of Panama, the Spaniards began to hear rumors of an empire to the south, where great stores of gold were to be found. Francisco Pizarro, one of the adventurers who had come out from Spain, believed these tales, and with the help of two friends, Diego del Almagro and a priest named Hernando de Luques, decided to go and search for the land of gold. Pizarro and Almagro had very little money, but de Luques had a small fortune, which he lent to his friends, and also used his influence to obtain help for them from the government. In the year 1524, Pizarro set out to find the "land of gold" which he had heard of, but it was three years before, after many tribulations, he reached the Gulf of Guayaquil. There he made friends with the natives, and the stories which they told him, and the gold that he saw, decided him to return to Spain and get full powers of conquest from the government. This he did. He himself was appointed a governor of any new countries that he might conquer. Almagro was made commandant, and de Luques was appointed bishop of the new province that was to be added to the Spanish possessions.

Pizarro came back to the New World with his new commission in his pocket, and presently he and his two friends set out with about two hundred men to conquer an empire. At Tumbez, on the Gulf of Guayaquil, they heard that Huascar and Atahuallpa, sons of the Inca who had just died, were at war with each other for the empire. Pizarro determined to take advantage of the divisions in the country, and with 168 men he set out to look for Atahuallpa. The little band of soldiers climbed through the mountains to the town of Cajamarca. The Inca came to meet them with a large number

NATURE'S MAJESTY IN THE NEW WORLD



Here we see the strait of Magellan, between the southern point of South America and the island of Tierra del Fuego. It was discovered by Magellan, in 1520, when he sailed the first voyage ever made round the world.



The Amazon is the greatest river in the world, and its name is from a native word meaning boat-destroyer. It is more than 3,000 miles long and 50 miles wide at its mouth, and its fresh water rushes out 200 miles into the sea. Here we see the mighty river where it starts as a tiny stream away up in the Andes.



Nature provides some majestic scenery in South America. Mountain and river are at their grandest in this vast land, and here we see a wonderful waterfall in the Argentine Republic known as the Iquazu Falls.

of unarmed followers, whom the Spaniards attacked, as you may read on page 2223, and the Inca was made prisoner. The Spaniards demanded a great sum for the Inca's release, but after part of it was paid, Pizarro had him tried for pretended treason, and put him to death. After that Pizarro made himself master of most of the western country, defeated a Peruvian army at the sacred city of Cuzco and made it a Spanish colony, and Almagro conquered the provinces round about Lake Titicaca. But when Almagro attacked the Araucanians to the south, he found he had to deal with an enemy far stronger than he had hitherto met, and he was unable to conquer these fierce tribes, whom the Incas before him had been unable to subdue. The Spaniards tried for two hundred years to bring the Araucanians into subjection, but failed, and finally had to recognize them as independent tribes. It was only in the last century that they were brought under the rule of Chile. Shortly after the conquest of Peru by Pizarro, an adventurer named Quesada advanced up the Magdalena from the north, conquered the Chibchas, slew the princes and enslaved the people. Their civilization was lost, and it is only recently that we have learned that they were almost as far advanced as the people of the Empire of Peru.

COLONIZATION BY SPAIN AND PORTUGAL IN NORTH AND EAST

The wild tribes of the north could make no stand against the trained soldiers of Spain, and fortified places were established along the coast of Venezuela without opposition.

In the east of the continent, the Portuguese established their claim to the coast from the Orinoco to the Rio de la Plata. The history of their settlements belongs to the history of Brazil, and you may read it in the story of that country in another place in the book.

Buenos Ayres was first founded in 1535 by Pedro de Mendoza, who had a commission from the king to establish colonies in the south. Mendoza himself sailed for Spain only to die on the voyage home. His followers found it impossible to hold the fort against the hostile Indians, so they sailed further up the river and founded Asuncion, but later on Buenos Ayres was again established.

LAWS MADE TO PROTECT THE INDIANS

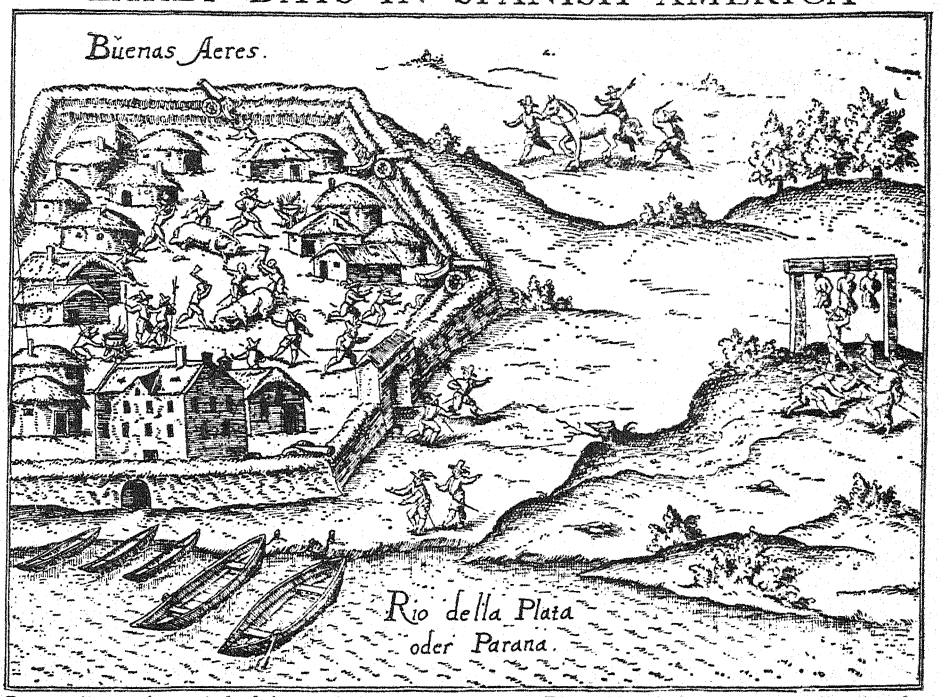
The Indians were never definitely enslaved, and in fact humane laws were made for their treatment. But the governors, soldiers and colonists were far away from Spain. They desired to have laborers to work in the mines, to build the cities and to cultivate the farms. The Indians were forced to work, too often under the lash, in the mines and on the estates. Numbers of them were practically reduced to slavery and gradually the Inca civilization was forgotten.

The clergy pitied the Indians and sought to shield them from hardship. Every effort was made to teach Christianity to them, and in time most of the old Peruvian people became Christians. The fierce Araucanians, however, refused to have missionaries, and most of the tribes of the eastern plains and forests could not be reached. This was not the fault of the missionaries, and the Jesuits in particular did all that men could do to teach these wild tribes. Their most famous mission was in the province which is now the republic of Paraguay, where they gathered large numbers of the Guarani Indians into village communities. For these villages the Jesuits adopted something like the government established by the Incas. The villagers were taught to sow and reap. They were taught Christianity, cleanliness and industry. There were large schools for the children, and the youths were trained as soldiers, so that they might defend themselves against slave traders from Brazil. But they were treated as children. No effort was made to teach them to be self-dependent, and when the Jesuits were expelled in 1768, most of the Guaranis wandered away.

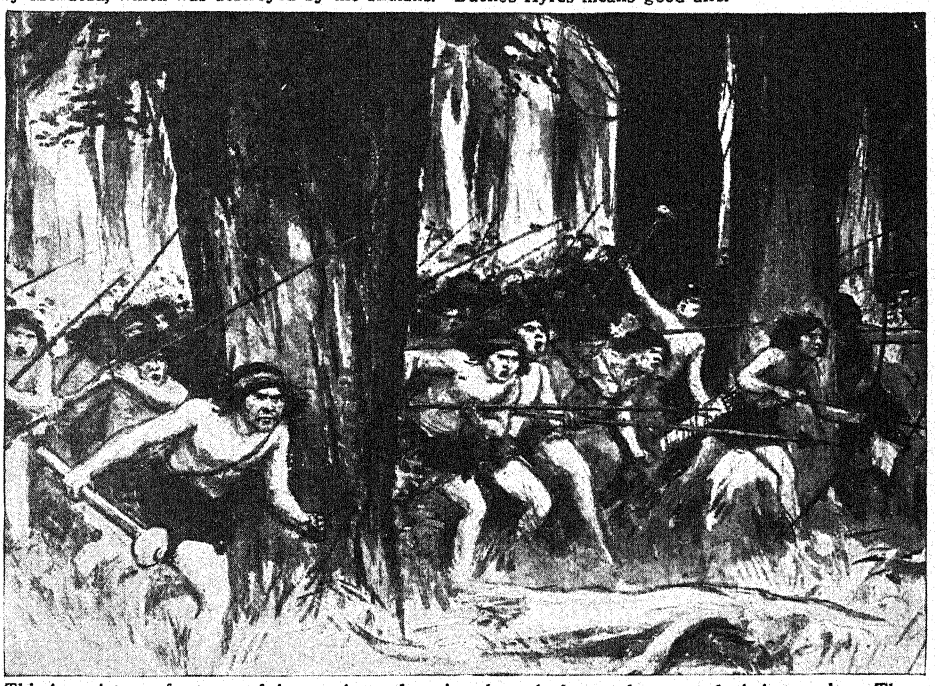
COLONIAL GOVERNMENT BY SPAIN

One of the hard and fast rules laid down for the government of the Spanish American colonies was that no one who was not a Spaniard should be permitted to trade with the colonies, and that the colonies should not send their exports direct to any foreign country. For over fifty years the government was able to keep foreigners away. Then the spirit of enterprise awoke in England, and the great adventurers Hawkins and Drake began their raids on the Spanish Islands and the Spanish Main, as the northern main-

EARLY DAYS IN SPANISH AMERICA



Buenos Ayres, the capital of Argentina, was first settled by Don Pedro de Mendoza, in 1535, who also founded Asuncion in Paraguay. The settlers were driven away by the Indians and it was not until 1542 that the Spaniards were able to make a permanent settlement. This is an old picture of the fort, built by Mendoza, which was destroyed by the Indians. Buenos Ayres means good airs.



This is a picture of a troop of Araucanians advancing through the woods to attack their enemies. These fierce people were never conquered by the Spaniards, and it was not until 1870 that they acknowledged themselves a part of the Chilean nation. Except that they have herds of cattle, they have made little progress since they first came in contact with white men. They make good soldiers, however.

land was then called. Their example was followed by French and Dutch adventurers, and there was an immense amount of smuggling done, of which the colonists were glad to take advantage, for the restrictions of trade fell hard upon them. Not only were they not allowed to trade with any foreign country, but all the trade with Spain had to go through the port of Seville, and the colonies were not allowed to trade with one another. Once a year fleets of ships gathered at Seville and Cadiz, were laden with goods for the colonies, and sailed under convoy to the west. All the goods for the west and south were carried across the Isthmus of Panama on the backs of mules or Indians, and were shipped again on the other side for the towns on the Pacific coast. For the return voyage the ships gathered at Havana and sailed for Seville, laden with the produce of the northern provinces, while the well-armed galleons carried the gold and silver and precious stones. During the times of Queen Elizabeth, the fleet was lucky if it escaped the loss of the treasure ships, and after James I made peace with Spain, the buccaneers, of whom we read elsewhere, made themselves a terror on the high seas.

For over two hundred years, all of Spanish South America, except Venezuela, was ruled from Lima, the capital of Peru, where the viceroy or king's representative lived. There were no assemblies, for Spain was an absolute monarchy, and the colonies were looked upon as the king's domains. The laws for the colonies were made by the king, with the assistance of the Council for the Indies. The country was divided into provinces and districts, presided over by governors and magistrates, who endeavored to carry out the king's law. Questions in dispute had to be referred to Lima, and you can imagine the vexatious delays that occurred when letters and reports had to be sent from Buenos Ayres or Asuncion and carried over the mountains. In 1739, however, the northwestern part of Peru was made into a viceroyalty called New Granada, and in 1776 another viceroy was appointed for the provinces from Bolivia eastward to the Atlantic.

No native born American, even though he was of pure Spanish descent, could hope to gain high office, for the governor and high officials in both the state and the army were sent from Spain. These officials looked down on the creoles, or Americans of Spanish descent, and the pride of the creoles found it hard to bear their disdain. Education, of course, was in the hands of the Church. There were schools for boys and girls, and colleges for the young men; and often the children of wealthy parents were sent to Europe for education. On the whole, however, the government thought it better that the people should not learn much, and education was discouraged.

THE WAR OF INDEPENDENCE, AND ITS CAUSE

There was a good deal of dissatisfaction in the colonies over the restrictions in trade and education, the lack of self-government, and what often amounted to tyranny by the governors. After the Revolution in North America, the unrest became stronger, and it was helped by the years of the Napoleonic Wars in Europe, during which there was little communication between the two continents.

The feeling of unrest became greater when Napoleon declared his own brother king of Spain in place of Ferdinand VII, whom he deposed. Little revolts against the Spanish officials began to break out all over the country, and in 1810 they flamed into rebellion. In May of 1810, Argentina revolted. July of the same year saw Venezuela in rebellion. New Granada had already declared itself a republic, and Chile soon joined. Years of warfare followed, but the colonists were in the end victorious, and the great Spanish dominion broke up.

The great leaders in the war of independence were Simon Bolivar in Venezuela, José de San Martin in Argentina and Bernardo O'Higgins in Chile. Bolivar, who is called "The Liberator," freed Venezuela, Colombia and Ecuador from Spanish dominion. O'Higgins was chiefly instrumental in winning the independence of Chile, while San Martin not only defeated the Spanish armies in Argentina, but brought an army to Peru and defeated them there. Spanish rule lasted longer in Peru than elsewhere; but finally Bolivar, who had been made president of Colombia, led an army into the north. In December, of 1894, the viceroy was taken prisoner by General Sucre, one of Bolivar's generals, and the three centuries of Spanish rule were over.

THE NEXT STORY OF COUNTRIES IS ON PAGE 4603.

LORD MACAULAY'S UNFINISHED POEM

WE have already read on page 1403 one of the finest of Lord Macaulay's "Lays of Ancient Rome," and we can remember the splendid martial strain of his poetry. In the following fragment of what would have been a long and thrilling poem had he lived to complete it, he celebrates in the same spirited style an episode in the history of Great Britain quite as worthy to be remembered in poetry as any of the great events of ancient Rome. The phrase in the twenty-second line about "treading the gay Lilies down" refers to the lilies which are the royal emblem of France, and "semper eadem," in the thirtieth line, is the Latin for "ever the same."

THE SPANISH ARMADA

CONTINUED FROM 4424

ATTEND all ye who list to hear our noble England's praise;
I tell of the thrice famous deeds she wrought in ancient days,
When that great fleet invincible against her bore in vain
The richest spoils of Mexico, the stoutest hearts of Spain.

It was about the lovely close of a warm summer day,
There came a gallant merchant-ship full sail to Plymouth Bay;
Her crew hath seen Castile's black fleet beyond Aurigny's isle,
At earliest twilight, on the waves lie heaving many a mile;
At sunrise she escaped their van, by God's especial grace;
And the tall Pinta, till the noon, had held her close in chase.
Forthwith a guard at every gun was placed along the wall;
The beacon blazed upon the roof of Edgecumbe's lofty hall;
Many a light fishing-bark put out to pry along the coast;
And with loose rein and bloody spur rode inland many a post.
With his white hair unbonnet'd the stout old sheriff comes;
Behind him march the halberdiers, before him sound the drums.
His yeomen, round the market-cross, make clear an ample space,
For there behoves him to set up the standard of Her Grace.
And haughtily the trumpets peal, and gaily dance the bells,
As slow upon the labouring wind the royal blazon swells.
Look how the Lion of the sea lifts up his ancient crown,
And underneath his deadly paw treads the gay Lilies down.
So stalk'd he when he turn'd to flight on that famed Picard field
Bohemia's plume, and Genoa's bow, and Cæsar's eagle shield:
So glared he when at Agincourt in wrath he turn'd to bay,
And crush'd and torn beneath his claws the princely hunters lay.

Ho! strike the flag-staff deep, Sir Knight; ho! scatter flowers, fair maids:
Ho! gunners, fire a loud salute: ho! gallants, draw your blades;
Thou sun, shine on her joyously—ye breezes waft her wide;
Our glorious SEMPER EADEM—the banner of our pride.
The freshening breeze of eve unfurl'd that banner's massy fold,
The parting gleam of sunshine kiss'd that haughty scroll of gold;
Night sank upon the dusky beach, and on the purple sea—
Such night in England ne'er had been, nor e'er again shall be.
From Eddystone to Berwick bounds, from Lynn to Milford Bay,
That time of slumber was as bright and busy as the day;
For swift to east and swift to west the ghastly war-flame spread;
High on Saint Michael's Mount it shone—it shone on Beachy Head.
Far on the deep the Spaniard saw, along each southern shire,
Cape beyond cape, in endless range, those twinkling points of fire;
The fisher left his skiff to rock on Tamar's glittering waves,
The rugged miners pour'd to war from Mendip's sunless caves.
O'er Longleat's towers, o'er Cranbourne's oaks, the fiery herald flew;
He roused the shepherds of Stonehenge, the rangers of Beaulieu.
Right sharp and quick the bells all night rang out from Bristol town,
And ere the day three hundred horse had met on Clifton Down;
The sentinel on Whitehall-gate look'd forth into the night,
And saw, o'erhanging Richmond Hill, the streak of blood-red light.
Then bugle's note and cannon's roar the death-like silence broke,
And with one start, and with one cry, the royal city woke.
At once on all her stately gates arose the answering fires;
At once the wild alarum clash'd from all her reeling spires;
From all the batteries of the Tower peal'd loud the voice of fear;

And all the thousand masts of Thames sent
back a louder cheer;
And from the furthest wards was heard the
rush of hurrying feet,
And the broad streams of pikes and flags
rush'd down each roaring street.
And broader still became the blaze, and louder
still the din,
As fast from every village round the horse
came spurring in;
And eastward straight, from wild Blackheath,
the warlike errand went,
And roused in many an ancient hall the
gallant squires of Kent.
Southward from Surrey's pleasant hills flew
those bright couriers forth;
High on bleak Hampstead's swarthy moor
they started for the North.
And on, and on, without a pause, untired they
bounded still,
All night from tower to tower they sprang;
they sprang from hill to hill;
Till the proud Peak unfurl'd the flag o'er
Darwin's rocky dales,
Till like volcanoes flared to heaven the stormy
hills of Wales,
Till twelve fair counties saw the blaze on
Malvern's lonely height,
Till streamed in crimson on the wind the
Wrekin's crest of light,
Till broad and fierce the star came forth on
Ely's stately fane,
And tower and hamlet rose in arms o'er all
the boundless plain;
Till Belvoir's lordly terraces the sign to Lincoln
sent,
And Lincoln sped the message on o'er the
wide vale of Trent;
Till Skiddaw saw the fire that burn'd on
Gaunt's embattled pile,
And the red glare on Skiddaw roused the
burghers of Carlisle.

HUNTING SONG

The author of this very famous hunting song is unknown, but he was certainly a true poet and a lover of the chase, for his lively verses breathe the very spirit of England's time-honored sport. The song is evidently of the time of Henry VIII.

THE hunt is up, the hunt is up,
And it is well nigh day;
And Harry our king is gone hunting
To bring his deer to bay.

The east is bright with morning light,
And darkness it is fled;
And the merry horn wakes up the morn
To leave his idle bed.

Behold the skies with golden dyes
Are glowing all around;
The grass is green, and so are the treen
All laughing at the sound.

The horses snort to be at sport,
The dogs are running free,
The woods rejoice at the merry noise
Of hey tantara tee ree!

The sun is glad to see us clad
All in our lusty green,
And smiles in the sky as he riseth high
To see and to be seen.

Awake all men, I say again,
Be merry as you may;
For Harry our king is gone hunting,
To bring his deer to bay.

TO A MOUNTAIN DAISY

This beautiful poem, by the great Scottish poet Robert Burns, contains a few words of his native tongue which American boys and girls may not understand. These are maun (must), stour (dust), wa's (walls), bield (shelter), and histie stibble (dry stubble). Few of the other words vary much from ordinary English.

WEE, modest, crimson-tippèd flower,
Thou'st met me in an evil hour;
For I maun crush amang the stour
Thy slender stem;
To spare thee now is past my pow'r,
Thou bonnie gem.

Alas! it's no thy neebor sweet,
The bonnie lark, companion meet,
Bending thee 'mang the dewy weet
Wi' spreckled breast,
When upward springing, blythe, to greet
The purpling East.

Cauld blew the bitter-biting North
Upon thy early, humble birth;
Yet cheerfully thou glinted forth
Amid the storm,
Scarce rear'd above the parent earth
Thy tender form.

The flaunting flow'rs our gardens yield,
High sheltering woods and wa's maun
shield;
But thou beneath the random bield
O' clod or stane
Adorns the histie stibble field,
Unseen, alane.

There, in thy scanty mantle clad,
Thy snawy bosom sunward spread,
Thou lifts thy unassuming head
In humble guise;
But now the share uptears thy bed,
And low thou lies!

AT SEA

There is a fine sense of the swift movement of a great ship across the salt sea in this poem by Allan Cunningham, a Scottish author who lived from 1784 to 1842, spending the half of his life in London, where he wrote a great deal about art.

A WET sheet and a flowing sea,
A wind that follows fast,
And fills the white and rustling sail
And bends the gallant mast;
And bends the gallant mast, my boys,
While like the eagle free,
Away the good ship flies, and leaves
Old England on the lee.

O, for a soft and gentle wind!
I heard a fair one cry;
But give to me the snorting breeze
And white waves heaving high;
And white waves heaving high, my boys,
The good ship tight and free—
The world of waters is our home,
And merry men are we.

There's tempest in yon hornèd moon,
And lightning in yon cloud;
But hark the music, mariners!
The wind is piping loud;
The wind is piping loud, my boys,
The lightning flashes free—
While the hollow oak our palace is,
Our heritage the sea.

HIS MOTHER'S JOY

LITTLE, I ween, did Mary guess,
As on her arm her baby lay,
What tides of joy would swell and beat,
Through ages long, on Christmas day.

And what if she had known it all,—
The awful splendour of his fame?
The inmost heart of all her joy
Would methinks have been the same:

The joy that every mother knows
Who feels her babe against her breast:
The voyage long is overpast,
And now is calm and peace and rest.

"Art thou the Christ?" The wonder came
As easy as her infant's breath:
But answer none. Enough for her,
That life had triumphed over death.

JOHN WHITE CHADWICK.

THE LOST DOLL

I ONCE had a sweet little doll, dears,
The prettiest doll in the world;
Her cheeks were so red and so white, dears,
And her hair was so charmingly curled.

But I lost my poor little doll, dears,
As I played on the heath one day;
And I cried for more than a week, dears,
But I never could find where she lay.

I found my poor little doll, dears,
As I played on the heath one day;
Folks say she is terribly changed, dears,
For her paint is all washed away,

And her arms trodden off by the cows, dears,
And her hair is not the least bit curled;
Yet for old sake's sake, she is still, dears,
The prettiest doll in the world.

CHARLES KINGSLEY.

THE MEN OF OLD

Lord Houghton, who was born in 1809 and died in 1885, was famous as the friend and patron of the poets of his days, eminent as a statesman, a great traveler, and no mean author both in prose and verse. In the following poem he justly celebrates the men of the past, whose lives were simpler than ours can be in this complex age. It is true that "a man's best things are nearest him." In all ages man has been prone to seek the things remotest from him, but it may be that this is Nature's way to maintain the progress of the race, although it is not the way to individual happiness.

I KNOW not that the men of old
Were better than men now;
Of heart more kind, of hand more bold,
Of more ingenuous brow;
I heed not those who pine for force
A ghost of time to raise,
As if they thus could check the course
Of these appointed days.

Still, it is true, and over-true,
That I delight to close
This book of life self-wise and new,
And let my thoughts repose
On all that humble happiness
The world has since foregone—
The daylight of contentedness
That on those faces shone!

With rights, though not too closely scann'd,
Enjoy'd as far as known,
With will, by no reverse unmann'd,
With pulse of even tone,
They from to-day, and from to-night,
Expected nothing more
Than yesterday and yesternight
Had proffer'd them before.

To them was life a simple art
Of duties to be done;
A game where each man took his part,
A race where all must run;
A battle whose great scheme and scope
They little cared to know,
Content, as men-at-arms, to cope
Each with his fronting foe.

Man now his virtue's diadem
Puts on, and proudly wears—
Great thoughts, great feelings, came to them
Like instincts unawares;
Blending their souls' sublimest needs
With tasks of every day,
They went about their gravest deeds
As noble boys at play.

And what if Nature's fearful wound
They did not probe and bare,
For that their spirits never swoon'd
To watch the misery there—
For that their love but flow'd more fast,
Their charities more free,
Not conscious what mere drops they cast
Into the evil sea.

A man's best things are nearest him,
Lie close about his feet;
It is the distant and the dim
That we are sick to greet;
For flowers that grow our hands beneath
We struggle and aspire—
Our hearts must die, except they breathe
The air of fresh desire.

Yet, brothers, who up Reason's hill
Advance with hopeful cheer—
Oh, loiter not, those heights are chill,
As chill as they are clear;
And still restrain your haughty gaze
The loftier that ye go,
Remembering distance leaves a haze
On all that lies below.

A NATION'S STRENGTH

These lines by Ralph Waldo Emerson, our great American writer, express the pith of much philosophy; and the strange thing is that while all will admit the truth which the poet utters, they are few, indeed who can bring themselves to shape their own conduct in accordance with it.

NOT gold, but only man can make
A people great and strong—
Men who, for truth and honour's sake,
Stand fast and suffer long.

Brave men who work while others sleep,
Who dare while others fly—
They build a nation's pillars deep,
And lift them to the sky.

THE STORMY PETREL

The sea-bird of this poem ranges the ocean, hardly ever coming to land. It is a small bird, not much bigger than a lark, and, save for a few white feathers on wings and tail, sooty black in color. Sailors call it "Mother Carey's Chicken," and, partly because it is always busiest in stormy weather, skipping from wave to wave, and partly because of its color, look upon it as a bird of ill omen. The poem is written by Barry Cornwall (Bryan Waller Procter), several of whose poems have already appeared in our book.

A THOUSAND miles from land are we,
Tossing about on the roaring sea;
From billow to bounding billow cast,
Like fleecy snow on the stormy blast.
The sails are scattered abroad like weeds;
The strong masts shake like quivering reeds;
The mighty cables and iron chains,
The hull, which all earthly strength disdains—
They strain and they crack; and hearts like stone
Their natural hard, proud strength disown.

Up and down! Up and down!
From the base of the wave to the billow's crown,
And amidst the flashing and feathery foam
The Stormy Petrel finds a home—
A home, if such a place may be
For her who lives on the wide, wide sea,
On the craggy ice, in the frozen air,
And only seeketh her rocky lair
To warm her young, and to teach them spring
At once o'er the waves on their stormy wing.

O'er the deep! O'er the deep!
Where the whale, and the shark, and the swordfish sleep,
Outflying the blast and the driving rain,
The Petrel telleth her tale—in vain;
For the mariner curseth the warning bird
Which bringeth him news of the storm unheard!
Ah! thus does the prophet of good or ill
Meet hate from the creatures he serveth still;
Yet he ne'er falters—so, Petrel, spring
Once more o'er the waves on thy stormy wing!

SORROW

We have our troubles, be they great or small, and it oftenest happens that that which hurts the deepest we shrink from uncovering to any human eye. This little poem by Alice G. Howard tells us that there is One from whom we may always be sure of obtaining sweetest sympathy and understanding

THE sorrow that nobody mentions,
The sorrow no one may share,
Is the sorrow the dear Lord giveth
His sweetest, tenderest care.

He places His hand on the wellspring,
The quivering lips refrain,
And the eyes smile forth in defiance,
His love enfolding the pain.

He knows where the hurt is the deepest,
The tears of night and of day,
And, whispering softly, "I love you,"
Brushes the teardrops away.

The sorrow that nobody mentions,
The sorrow no one may share,
Is the sorrow the dear Lord giveth
His sweetest, tenderest care.

GREAT NATURE IS AN ARMY GAY

Richard Watson Gilder, who was born in 1844 and became editor of "The Century Magazine" in 1881, was an accomplished American poet. When he sings of nature, he sometimes strikes a serious and almost a forbidding note, as in this fine example of his skill. The brisk idea of the opening lines is not maintained, and the reader soon begins to think that nature's army, so far from being "gay," is an appalling host of ants or locusts that mean to devour everything in their path, leaving not a shred behind—not even the poor author.

GREAT Nature is an army gay
Resistless marching on its way;
I hear the bugles clear and sweet,
I hear the tread of million feet.
Across the plain I see it pour;
It tramples down the waving grass;
Within the echoing mountain-pass
I hear a thousand cannon roar.

It swarms within my garden gate;
My deepest well it drinketh dry.
It doth not rest; it doth not wait;
By night and day it sweepeth by
Ceaseless it marches by my door;
It heeds me not, though I implore.
I know not whence it comes, nor where
It goes. For me it doth not care
Whether I starve, or eat, or sleep,
Or live, or die, or sing, or weep.
And now the banners all are bright,
Now torn and blackened by the fight.
Sometimes its laughter shakes the sky,
Sometimes the groans of those who die.
Still through the night and through the live-long day
The infinite army marches on its remorseless way.

NOVEMBER IN ENGLAND

This poem is an excellent example of the half-serious, half-jocular spirit in which Thomas Hood could write when the mood seized him. He was, of course, capable of serious and more enduring work, as in his "Song of the Shirt," on page 2129, and "The Dream of Eugene Aram," on page 2818; but this little ode to November is perfect in its feeling of helpless despair. The description suggests London rather than England, and it was most likely out of the fulness of his own experience of a November fog in the metropolis that the afflicted poet produced this bundle of negatives.

NO sun, no moon,
No morn, no noon,
No dawn, no dusk, no proper time of day;
No sky, no earthly view,
No distance looking blue,
No road, no street, no "t'other side the way";
No end to any "row,"
No indications where the crescents go;
No top to any steeple,
No recognition of familiar people,
No courtesies for showing 'em,
No knowing 'em!
No travelling at all, no locomotion,
No inkling of the way—no notion,
"No go"—by land or ocean—
No mail, no post,
No news from any foreign coast;
No park, no ring, no afternoon gentility,
No company, no nobility;
No warmth, no cheerfulness, no healthful ease,
No comfortable feel in any member,
No shade, no shine, no butterflies, no bees,
No fruits, no flowers, no leaves, no birds—
November!

BATTLE-HYMN OF THE REPUBLIC

Mrs. Julia Ward Howe, who, in her ninety-second year, died in 1910, may be described as one of the most eminent women of America. She won fame both as a writer and a speaker, and wrote many books, but will be remembered chiefly for this celebrated poem, written in the early days of the American Civil War, to encourage the soldiers of the North in fighting for the preservation of the Union.

MINE eyes have seen the glory of the coming of the Lord:
He is trampling out the vintage where the grapes of wrath are stored;
He hath loosed the fateful lightning of His terrible swift sword:
His truth is marching on.

I have seen Him in the watch-fires of a hundred circling camps;
They have builded Him an altar in the evening dews and damps;
I can read His righteous sentence by the dim and flaring lamps:
His day is marching on.

I have read a fiery gospel writ in burnish'd rows of steel:
"As ye deal with my contemners, so with you My grace shall deal;
Let the Hero, born of woman, crush the serpent with His heel,
Since God is marching on."

He hath sounded forth the trumpet that shall never call retreat;
He is sifting out the hearts of men before His judgment-seat:
Oh, be swift, my soul, to answer Him! Be jubilant, my feet!
Our God is marching on.

In the beauty of the lilies Christ was born across the sea,
With a glory in His bosom that transfigures you and me:
As He died to make men holy, let us die to make men free,
While God is marching on.

SONG OF BIRDS

Longfellow in these pleasant verses seeks to impress our minds not merely with the remembered joy of the singing of some lark or thrush, but with a sense of the immenseness of the joyous bird-song which this world of ours contains. For though around our own house, or in the woods near by, the voices of the birds may be silent for the moment, elsewhere their songs are rising, as they will again rise on our own ears; "the birds are singing for evermore."

DID you ne'er think what wondrous beings these?
Did you ne'er think who made them, and who taught
The dialect they speak, where melodies
Alone are the interpreters of thought?
Whose household words are songs in many keys,
Sweeter than instrument of man e'er caught;
Whose habitations in the tree-tops even
Are half-way houses on the road to heaven!

Think, every morning, when the sun peeps through
The dim, leaf-latticed windows of the grove,
How jubilant the happy birds renew
Their old melodious madrigals of love!
And, when you think of this, remember, too,
'Tis always morning somewhere, and above
The awakening continents, from shore to shore,
Somewhere the birds are singing evermore!

THE PRINCESS

(Selected)

THE woman's cause is man's: they rise or sink
Together, dwarfed or godlike, bond or free:
For she that out of Lethe scales with man
The shining steps of Nature, shares with man
His nights, his days, moves with him to one goal,
Stays all this fair young planet in her hands—
If she be small, slight-natured, miserable,
How shall men grow? but work no more alone!
Our place is much: as far as in us lies
We two will serve them both in aiding her—
Will clear away the parasitic forms
That seem to keep her up but drag her down—
Will leave her space to bourgeon out of all
Within her—let her make herself her own
To give or keep, to live and learn and be
All that not harms distinctive womanhood.
For woman is not undeveloped man,
But diverse: could we make her as the man,
Sweet Love were slain: his dearest bond is this,
Not like to like, but like in difference.
Yet in the long years liker must they grow;
The man be more of woman, she of man;
He gain in sweetness and in moral height,
Nor lose the wrestling thews that throw the world;
She mental breadth, nor fail in childward care,
Nor lose the childlike in the larger mind;
Till at the last she set herself to man,
Like perfect music unto noble words.

ALFRED, LORD TENNYSON.

THE UGLY PRINCESS

The moral to be drawn from these verses by Charles Kingsley is that men foolishly judge by appearances, and are more apt to admire and bow before mere physical beauty than to look in one who is outwardly ugly for that inner and unfading beauty of the soul, though it often happens that a beautiful spirit has but a poor and unattractive dwelling-place.

MY parents bow, and lead me forth,
For all the crowd to see—
Ah, well! the people might not care
To cheer a dwarf like me.

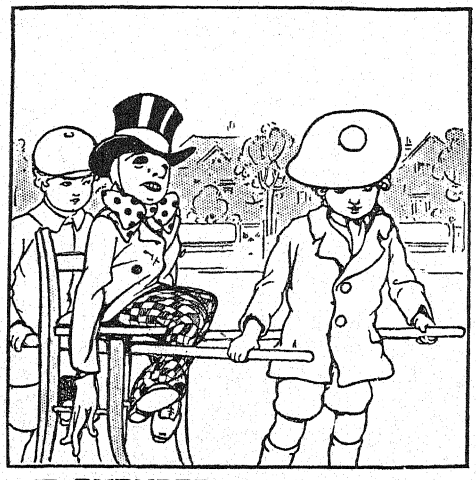
They little know how I could love,
How I could plan and toil,
To swell those drudges' scanty gains,
Their mites of rye and oil.

They little know what dreams have been
My playmates, night and day;
Of equal kindness, helpful care,
A mother's perfect sway.

Now earth to earth in convent's walls,
To earth in churchyard sod:
I was not good enough for man,
And so am given to God.

LITTLE VERSES FOR VERY LITTLE PEOPLE

THE Hart he loves the high wood,
The Hare she loves the hill,
The Knight he loves his bright sword,
The Lady loves her will.



REMEMBER, remember
The fifth of November,
Gunpowder, treason, and plot ;
I know no reason
Why gunpowder and treason
Should ever be forgot.

HERE we go round a ginger ring,
A ginger ring, a ginger ring ;
Here we go round a ginger ring,
Around about merry my Tansy.

A bowlful of nuts we sat down to crack,
Sat down to crack, sat down to crack ;
A bowlful of nuts we sat down to crack,
Around about merry my Tansy.

What will you give us to tell his name,
To tell his name, to tell his name ;
What will you give us to tell his name,
Around about merry my Tansy ?

The last time is the catching time,
The catching time, the catching time ;
The last time is the catching time,
Around about merry my Tansy.

"OLD woman, old woman, shall we go shearing ? "
"Speak a little louder, sir, I am very hard of hearing."
"Old woman, old woman, shall I love you dearly ? "
"Thank you, kind sir, I hear you very clearly."

MR. EAST gave a feast ;
Mr. North laid the cloth ;
Mr. West did his best ;
Mr. South burnt his mouth
With eating a cold potato.

POOR old Robinson Crusoe !
Poor old Robinson Crusoe !
They made him a coat
Of an old nanny goat,
I wonder how they could do so !
With a ring a ting tang,
And a ring a ting tang,
Poor old Robinson Crusoe !

BETTY PRINGLE had a little pig,
Not very little, and not very big.
When he was alive he lived in clover,
But now he's dead, and that's all over.
So Billy Pringle he lay down and cried,
And Betty Pringle she lay down and died ;
So there was an end of one, two, and three :
Billy Pringle he,
Betty Pringle she,
And the piggy-wiggy.

"MOTHER, may I go to swim ? "
"Yes, my darling daughter,
Hang your clothes on yonder tree,
But don't go near the water."



OH where and oh where is my little wee dog ?
Oh where and oh where is he ?
With his ears cut short and his tail cut long,
Oh where and oh where can he be ?

THE POOR BABES IN THE WOOD

MY dear, do you know,
How a long time ago,
Two poor little children,
Whose names I don't know,
Were stolen away on a fine summer's day,
And left in a wood, as I've heard people say?

And when it was night,
So sad was their plight,
The sun it went down,
And the moon gave no light.
They sobbed and they sighed, and they bitterly cried,
And the poor little things, they lay down and died.



And when they were dead,
The robins so red
Brought strawberry-leaves,
And over them spread.
And all the day long
They sung them this song:
"Poor babes in the wood! Poor babes in the wood!
And don't you remember the babes in the wood?"

NURSERY RHYMES OF CHILDREN OF FRANCE

The English version of these Rhymes appears side by side with the French.

C'EST la mère Michel qui a perdu son chat.
Qui crie par la fenêtre à qui le lui rendra,
Et le compère Lustucru qui lui a répondu :
" Allez, la mère Michel, votre chat n'est pas perdu."
C'est la mère Michel qui lui a demandé :
" Mon chat n'est pas perdu ! vous l'avez donc trouvé ? "
Et le compère Lustucru qui lui a répondu :
" Donnez une récompense, il vous sera rendu."
Et la mère Michel lui dit : " C'est décidé,
Si vous rendez mon chat, vous aurez un baiser."
Le compère Lustucru, qui n'en a pas voulu,
Lui dit : " Pour un lapin votre chat est vendu ! "

MOTHER MITCHELL one day lost her pussy, alack !
And cried out of window : " Oh, who'll bring her back ? "
Then old Gaffer Lustucru smilingly said :
" Your cat isn't lost—she is merely mislaid."
Mother Mitchell cried, hopefully gazing around her :
" My pussy not lost ! Oh, pray, have you found her ? "
Then old Gaffer Lustucru answered her pat :
" If you give a reward, you will soon get your cat."
Said old Mother Mitchell : " 'Twould not be amiss,
If you find me my pussy, to give you a kiss."
But sly Gaffer Lustucru much preferred gold,
And said : " As a rabbit your pussy is sold ! "

LA boulangère a des écus
Qui ne lui coûtent guère ;
Elle en a, je les ai vus.
J'ai vu la boulangère aux écus,
J'ai vu la boulangère.

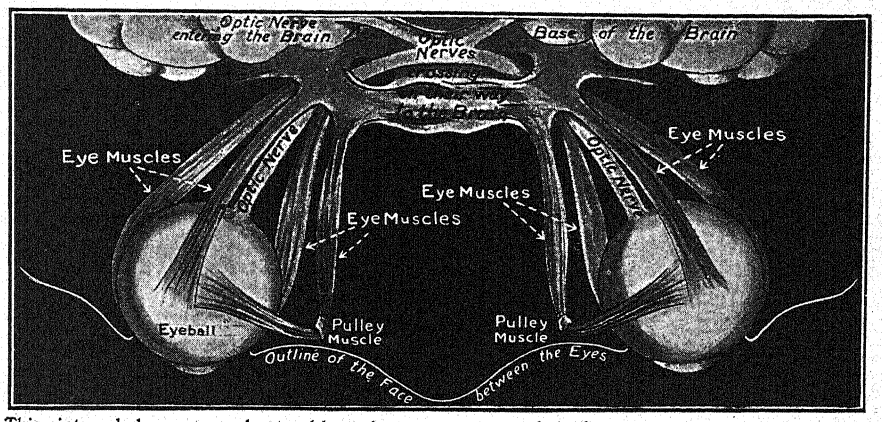
THE baker's wife has sacks of gold,
And yet, upon my life,
She's not content, so I've been told.
I've seen the baker's wife's red gold,
And seen the baker's wife.

FAIS dodo, Colas, mon petit frère,
Fais dodo, t'auras du lolo.
Maman est en haut,
Qui fait du gâteau ·
Papa est en bas,
Qui fait du chocolat ;
Fais dodo, Colas, mon petit frère,
Fais dodo, t'auras du lolo.

HUSH-A-BYE, Colin, brother of mine,
Mustn't cry, hush-a-bye.
Mamma's up above,
Making cakes for you, love ;
And Daddy, downstairs,
Nice choc'late prepares.
Hush-a-bye, Colin, brother of mine,
Mustn't cry, hush-a-bye.

AU clair de la lune,
Mon ami Pierrot,
Prête-moi ta plume
Pour écrire un mot.
Ma chandelle est morte,
Je n'ai plus de feu ;
Ouvre-moi la porte
Pour l'amour de Dieu !
Au clair de la lune,
Pierrot répondit :
Je n'ai pas de plume,
Je suis dans mon lit.
Va chez la voisine,
Je crois qu'elle y est,
Car, dans sa cuisine,
On bat le briquet.

BY the moon's silver ray,
Dear Pierrot mine,
A pen lend me, pray,
To write thee a line.
My candle has died,
With cold I'm aquake ;
Thy door open wide,
For dear Heaven's sake !
By the light of the moon,
Cruel Pierrot said :
I'll not grant thy boon,
For I am abed.
At our neighbor's, may be,
Thou canst letters indite,
In her kitchen, I see,
They are striking a light.



This picture helps us to understand how the eyes grow out of the brain, the optic nerve projecting till it expands into the hollow cup of the eyeball. The muscles that move the eyes are also shown.

SEEING COLORS

CONTINUED FROM 4430



IN some ways, the most wonderful of all the feats that the eye performs is the seeing of colors, and this subject of color vision, as it is usually called, is also very important from the practical point of view, because in many cases we require to distinguish one color from another; and sometimes the lives of many people may depend upon the certainty with which this is done.

We know that light is a wave motion in the ether. A better way of putting it would be that there are wave motions in the ether which, when they fall upon an eye, give rise to light. Apart from eyes to see, all Nature is in darkness. Neither the eye nor the ether alone can make light, but both are required. We can count the number of vibrations of the ether that affect the eye in a single second.

The smallest number per second that we can see is roughly about four hundred billions. When we see these we get an impression of red. The highest number we can see is roughly about eight hundred billions, and when such vibrations affect our eyes we see a sort of violet.

Now, in music, a note that is an octave higher than another has exactly twice the number of vibrations in a second; and so we may say that the amount of light that our eyes can see corresponds to one octave, the number of vibrations of the violet being about twice the number of the red. We must clearly remind ourselves once more that just as there are sounds higher and lower in pitch than the eleven octaves or so which we can hear, so there are ether vibrations higher and lower in pitch than the one octave or so that we can see.

We know that our distinguishing of colors depends upon the cones in the retina. We are bound to suppose that in those kinds of eyes where there are only rods, colors cannot be distinguished as they are seen by us; and we begin to understand the immense advantage of having a place in our eyes which is the most sensitive of all, and contains only cones.

From all this it follows that we do not see the colors of objects whose light falls upon the outermost parts of the retina, where there are no cones, or practically none. Also our eyes vary in sensitiveness at different parts of the color scale.

At the actual extremes, such as red and blue, we do not notice slight differences in color so sharply as we do in between the extremes, as in the yellow and green.

Colors vary in several ways. For instance, they vary in brightness, as we all know. The brightness of a color depends simply upon the extent to which it excites the brain. We cannot say why one color, because it is that color, should affect the brain more than another; but it is so.

Secondly, we find that colors vary in their hue, or tint, and that depends on the number of vibrations in each second of the ether waves which cause the color.

Thirdly, colors vary very much in what is called purity, or richness. The best types of eyes are very keen to appreciate this quality in colors. A pure color is one which depends upon light of one rate of vibration. The purity of a color is destroyed when it is mixed with other colors, or when it is mixed with white light, which really comes to the same thing, as white light contains all the colors.

THE MYRIADS OF COLORS THAT WE CANNOT SEE AT ALL

Now, quite apart from any question of the eyes, the question of color is simple, because it is exactly the same as the question of the pitch of sounds. Ten vibrations a second means one sound, eleven means another, twelve another, and so on; or there might be twelve and a half, and that would be a sound of still another pitch. In the same way, between light made of waves running four hundred billions to the second and light made up of waves running eight hundred billions to the second there is really an infinite number of colors—hundreds of billions of colors. That is all very well, but when it comes to our seeing them we find that the case is different.

If we take white light and pass it through a prism, we get a band of colors called the spectrum, and when we look at it we quite clearly get the impression not of a regular even change of color from one end to the other, but of comparatively few colors to which we give definite names. Of these various colors, which are commonly described as seven, some give us the impression of being mixed, and others of being pure. For instance, the color we call purple is mixed, because, when we come to consider it, we see that what we call purple is really the result of our seeing a blue and a red together. What we call orange is mixed; what we are really seeing is a red and a yellow together. Then, again, Prussian blue is not a pure blue, but a mixture of blue and green.

THE THREE PURE COLORS THAT ARE NOT MADE UP OF OTHER COLORS

Now contrast with these colors such a color as crimson red. Nothing will persuade us that that is a mixture of other colors; it is simply red itself. There is also a tone of green which we cannot imagine to be made up of anything else, and the same is true of ultramarine blue. Probably these are the only three colors of which this can be said. We therefore call red, green, and blue primary colors. The meaning of this is almost always misunderstood.

When we call red, green, and blue primary colors, we are not saying anything about light; we are talking about the way in which the eye sees. Light consists of waves of every rate of vibration, and any one of these rates is as good as another. But the eye, instead of being able to see each of these, has within itself means for seeing only three of them directly, and these three are red, green, and blue.

All the other colors it sees by mixing in various proportions these three kinds of sensation, and that is why we call red, green, and blue primary colors. By mixing these in various ways we can obtain the impression upon the eye of every kind of color that it can see. By mixing red and green rays in various proportions we can get the effect of all the scarlets, oranges, yellows, and yellow-greens; by mixing red and blue rays we can get all the various violets and purples; and by mixing the green and blue rays we can obtain all the various shades of blue-green.

To the three primary colors we have to add a fourth—the grey color which we get from the rods of the retina. We read about this on page 4429.

A POWER THAT NO MAN UNDERSTANDS, BY WHICH WE SEE DIFFERENT COLORS

Of course, we now want to know what are the things in the eye which correspond to these various kinds of color sensation. This can be clearly answered as regards the grey color, for we know that that is due to the rods. We know also that the

cones are responsible for the other three kinds of color sensation; but, unfortunately, we can go no farther than this, except by guessing. For instance, we do not find that there are three different sorts of cones, nor do we find, as some have supposed, that there are three different parts to each cone—one for each kind of color.

Nor can we show that there are three different kinds of nerves running from the retina to the brain, as Dr. Young supposed a century ago. It may, indeed, be that we are altogether mistaken in looking at the retina for the key to the fact that we see colors by these three sensations. It may be that the key to the facts is to be found not in the retina at all, but in the grey matter of the vision part of the brain. The fact that a man may be color-blind in one eye is rather against this.

As a rule, color-blindness occurs in both eyes, but there are cases where it is found in one eye only, and that, of course, suggests that it is the eye rather than the brain that is responsible for color vision. Color-blindness is almost always a state of things which exists from birth, and there is no cure for it.

PEOPLE WHO COULD NOT SEE THE COLOR PICTURES IN THIS BOOK

About four men out of a hundred, it is said, have one form or other of color-blindness, and about one woman in a hundred. This is by no means the only case in which peculiarities are found more commonly in men than in women. Color-blindness is passed on from parents to children, and we have lately gone far to understand the laws by which it is inherited.

Very rarely we find people who are quite color-blind. The spectrum of sunlight to them appears in shades of grey throughout, being lightest in the position of yellow-green, and darkest at each end. A colored picture to them looks like a photograph or an engraving. If we believe that our three color sensations depend on the presence of three special chemical substances in the retina, then we must suppose that in such cases all these three substances are absent.

Very rare also is "blue-blindness," in which the possibility of blue sensation is absent. Then there is "green-blindness," common, and very important, in which we suppose that the substance corresponding to the green sensation is absent; in such cases bright green is confused with dark red, and a dark green letter on a black background is not seen at all. If we remember that everywhere on railways red is used as the color of danger, while green allows the driver to go on, we shall understand how very serious it would be if a railway signalman could not distinguish between a bright green color and a dark red color.

WHY RAILWAY SIGNALS ARE ALWAYS RED, GREEN, AND WHITE

Lastly, there is "red-blindness," also common, which is sometimes called Daltonism, because Dalton, the man who first wrote a description of color-blindness, suffered himself from red-blindness. Here we suppose that the chemical substance affected by light and corresponding to red sensation is absent from the retina. In these cases light red is confused with dark green, and a dark red letter on a black background is not recognized at all.

Now, as nearly all color-blind men are either red-blind or green-blind, it was suggested that signal colors, instead of being red, green, and white, should be changed; for instance, blue and yellow might be employed. But this does not do. The only convenient colors to use for this purpose are red, green, and white.

It is found that a red glass allows about ten per cent. of the light behind it to come through, and a green glass rather more, but a blue glass allows only about 4 per cent. of the light to come through; and yellow does not do, for there are states of the light in which yellow would not be noticed.

It is necessary, then, to test people who are to be expected to recognize lights, and if they are color-blind they must find some other employment. Even now, although there has been a great deal of discussion about it, both seamen and railwaymen are not looked after carefully enough in this respect.

THE BEST WAY OF FINDING OUT IF WE ARE COLOR-BLIND

Scores of different methods have been invented for detecting color-blindness. The best method, which is generally employed, is the use of colored worsteds, and the person who is being tested is asked to match them. If a green-blind man is handed a skein of pale green worsted, and if he draws from the heap

some worsteds which contain no green at all, then he must not be passed; or if a man takes a dark green as a match to a dark red skein, he proves himself to be red-blind, and must therefore be rejected.

HOW WE CAN REST OUR EYES BY LOOKING AT THINGS A LONG WAY OFF

Enough has already been said about spectacles and their importance in correcting the errors of refraction. Here we must note a few points which will help us to preserve our eyes, quite apart from the use of spectacles.

When the muscles inside the normal eye are at rest, the shape of the lens and other parts is such that the eye is fitted to see distant objects. There can be no doubt that the first and most natural uses of the eye are for distant and not for near vision. The course of our lives is now such that we use our eyes very much at short distances, and this means the use of the muscles inside them. That is especially true of long-sighted persons, who should, of course, not use their eyes at short distances without glasses. But, apart from that, it is a good rule for all of us to relax our eyes, when we can, by letting them rest upon something which is distant, and so giving the muscles inside them a rest, and lessening the risk of strain.

The best light for vision is daylight—not direct sunlight, but diffused daylight reflected from the sky. When we use artificial light, which we do more and more, it is a safe rule that the nearer it resembles diffused daylight, the better it will be. When we call daylight diffused, what we mean is that it comes from a large surface—the general surface of the sky. What we call a soft light is always one that is diffused in this way. Other things being equal, the larger the surface from which the light comes to our eyes, the softer it is, as Lord Rayleigh, a distinguished scientist, pointed out a good many years ago.

THE BEST WAY TO LIGHT OUR HOUSES AND TO PAPER OUR ROOMS

In modern buildings the lights themselves should be entirely hidden, and we should see by light reflected from wall or ceiling. Of course, this is expensive, because more light is required; but, though it costs more money, it saves our eyes very much.

Another great fact about diffused daylight is that it is steady, and so should artificial light be. In this respect gas is a great improvement upon candles, and electric light is the best of all.

It has lately been shown by some French students that the different qualities of light affect our eyes in different ways, quite apart from their brightness. The safe rule is that we should, as far as possible, make our artificial light of the same composition as sunlight.

In our houses, if we are wise, we shall have spaces upon which the eyes can rest. This means that we shall think twice before we use wall-papers with marked patterns; this is true especially of bedrooms, because, sooner or later, someone is likely to lie ill in a bedroom, and, whatever healthy people can stand, wall-papers with patterns are a distress and a nightmare to sick people.

THE SAFE RULE FOR READING BY DAY AND NIGHT

Great stretches of Nature are green. There is probably no color which fatigues the eye less in proportion to its brightness than the green of fresh young leaves. This is good for bedrooms and living rooms alike. Dead white is fatiguing to the eyes, and best avoided. It is excessively foolish to read with the eyes facing a source of light, especially as the light is anything but diffused. We should read with the light behind us, passing over one shoulder or the other—the left shoulder, of course, when we are writing.

So far as children are concerned, we must remember that the great majority of them are long-sighted when they are very young, and that therefore the strain of using their eyes at short distances is even greater for them than for us. The fact that the child is long-sighted ought to be hint enough to us that the best employment for its eyes at early ages is not at short distances. Few and short stretches of reading and writing are all that we ought to require of these young eyes. On the whole, the best work for a small child is its play, and its best play is open-air play with balls and hoops, and so on.

When we *do* set children to read, we must remember that we are taking certain risks with their eyes. We should take great care of the lighting arrange-

ments; we must provide glasses if the child is too long-sighted; we should be most careful to use large type deeply printed; and, in any case, the periods of reading should be brief. It is much better to employ some kind of print that makes the letters in very simple shapes.

WHAT YOUR EYES SEE WHEN YOU ARE READING THIS PAGE

When we come to think of the case of a printed page, we shall see that the letters which we distinguish are the only places where the eye does not see. What we see when we read is not the black, but the white; the letters are not really anything that we see, but gaps in our seeing. As the white occupies a great deal more space than the black, it is evident that our eyes would be much less fatigued if the state of things were reversed, and books were printed in white letters on black paper. If that were so, the eye would be rested everywhere except where there were the letters which it wishes to see.

But reading is not the only use for the eyes, and there are a great many people who think that, while we spend so much time upon reading, we are forgetting to keep our eyes open in other ways.

The time may come when the education of the eye in other matters than reading will always be included in the upbringing of any child. The time for this education, as for every kind of education, is youth, and one great difference between this kind of education of the eye and the kind that has to do with reading and writing is that it is much more suited to the young eye, which it cannot harm.

HOW GAMES OF BALL TEACH THE EYES TO WORK TOGETHER

First, then, we should educate the eye as an instrument to work with the rest of our bodies. This is the great value of games of ball for young people. They teach the two eyes how to work together, how to judge distance and rates of movement, and then, by practice, they make strong and sure connections between the parts of the brain that have to do with the eye and those which give orders to the muscles. In the whole of the after life it is exceedingly valuable to have these different brain centres well connected in this way.

Second, the eye should be carefully trained by means of drawing and modeling. We are all clumsy when we are very young. The good use of the fingers is invaluable in a thousand ways. One of the great reforms in education of the near future will be the greater use of the hands and fingers.

This really means the greater training of the eye, for a good deal of clumsiness of the finger is really clumsiness of the untrained eye. Drawing and modeling strain the eyes far less than reading and writing, and a great argument in their favor is the pleasure with which children take to them. They not only train the eye as an instrument of the will, helping us to do what we want, but they also train it as an instrument of the part of our nature which thinks.

A GREAT MAN WHO WOULD STAND FOR TEN MINUTES BEFORE A FLOWER

The highest use of the eyes is that which is most neglected in all systems of education at present; it is the use of the eyes as instruments for observing with, for seeing what are the facts of earth and sea and sky, so that we may think about them—that is to say, the highest use of the eye is that which serves the highest part of our minds, but for this the eye requires great training.

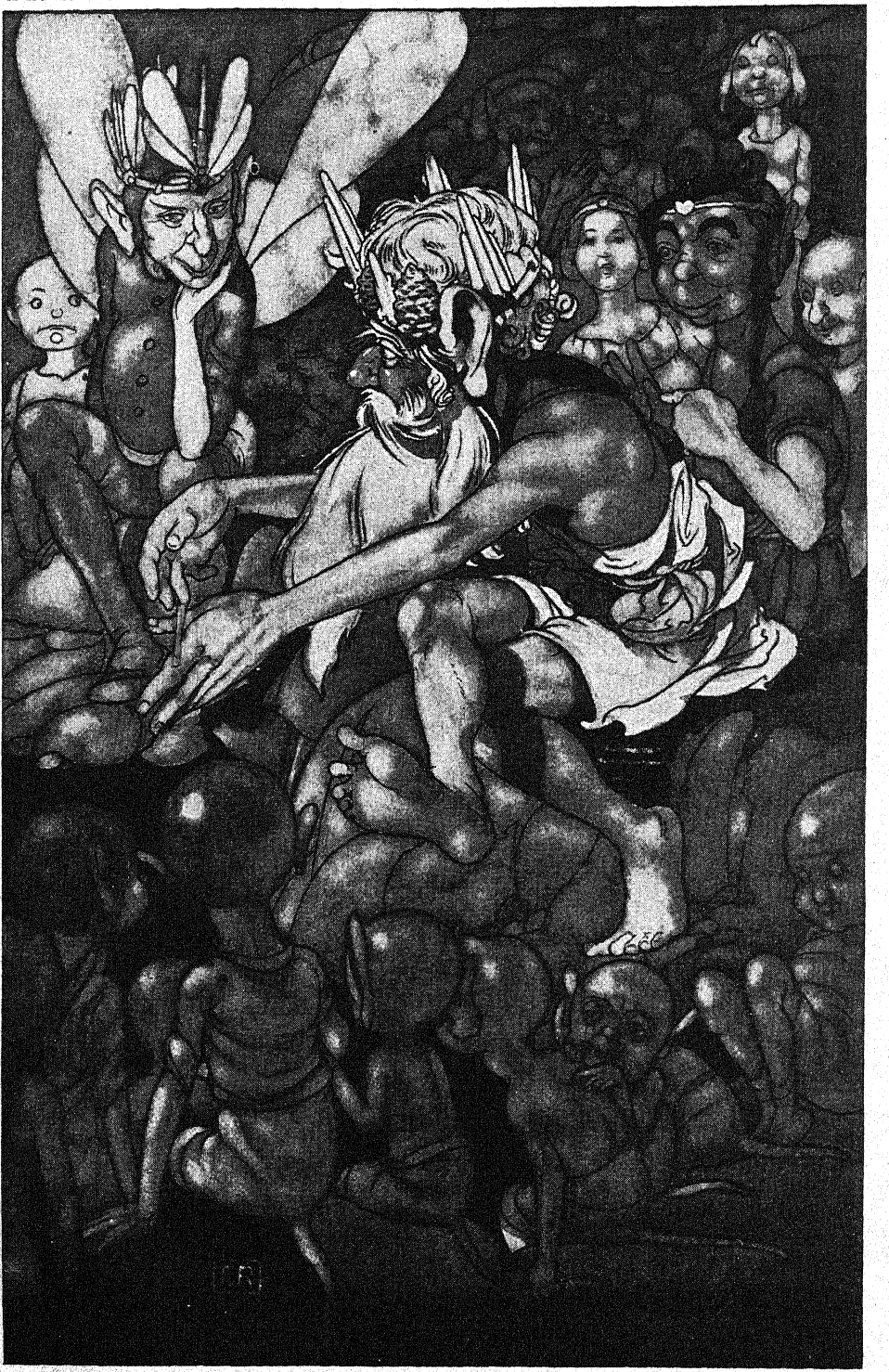
A little story about one of the greatest men who ever lived will show us the difference between the eye that has been taught to see and the eye that has not been so taught.

One of his friends once asked Charles Darwin's gardener about his master's health, and how he had been progressing lately.

"Oh," he said, "my poor master has been very sadly! I often wish he had something to do. He moons about in the garden, and I have seen him stand doing nothing before a flower for ten minutes at a time. If he only had something to do, I really believe he would be better."

But Darwin was really seeing great truths about the flower which no eye had ever seen before, and which the gardener was quite incapable of seeing, however closely he might look at the same flower. It is the kind of seeing which was practised by Charles Darwin that we should also try to practise.

THE NEXT PART OF THIS IS ON PAGE 4635.



The old goblin from Norway spoke pleasantly about the stately rocks and foaming waterfalls of his home. He told of the clear winter nights, the sleigh-bells, and how the boys run with torches over the smooth ice.



THE ELFIN HILL

CONTINUED FROM 4416

SOME lizards were scampering about in the hollow of an old decayed tree.

"What a noise is going on in the Elfin Hill!" said one. "I have not been able to close my eyes for two nights."

"They propped up the top of the hill with four red posts till cock-crow this morning, so that it is well aired, and the elfin maidens have learned new dances," said another lizard.

"The blind earth-worm has just come from the Elfin Hill," cried a third lizard. "He says that they expect grand company. All the will-o'-the-wisps are preparing a torch-dance."

"Who can these strangers be?" asked all the lizards. "Whatever is the matter?"

Just then the Elfin Hill opened, and an old elfin maiden came out and tripped down to the seashore to the night-raven.

"You are invited to the hill to-night," said she; "but the king wishes you to take round the invitations."

"Who is to be asked?" asked the raven.

"Everyone may come to the great ball, even humans, if they can only talk in their sleep. But for the feast we can only ask persons of high rank, the merman and his daughter, all the old demons of the first class, with tails, the hobgoblins, and the little imps."

"Croak!" said the night-raven, as he flew off on his errand. The elfin maidens were already dancing, clad in shawls woven from moonshine and mist. The hall of the Elfin Hill had been washed with moonshine, and the walls glowed like tulips. In the kitchen frogs were being roasted, and salads of mushrooms and hemlock were being prepared. The king's gold crown was being polished with the best ground slate pencil, and there was a hustle and a bustle everywhere.

"Father dear," asked the elf-king's youngest daughter, "may I now hear who our noble visitors are?"

"I suppose I must tell you," he replied. "Two of my daughters must be married shortly, for the old goblin, from Norway, who is very, very rich, is coming with his two sons, both of whom are seeking wives. The old goblin is an honest old Norwegian, cheerful and straightforward, but they say that his boys are bad-mannered. You must show me that you know how to teach them manners."

Two will-o'-the-wisps then rushed in to the king's presence, breathless.

"They are coming! They are coming!" cried the foremost.

"Give me my crown," said the king, "and let me stand in the moonshine."

The daughters put on their shawls and bowed low. Before them stood the old goblin from Norway, wearing a crown of ice and polished fir-cones. Beside him were two strong, bare-throated men, his sons.

"Do you call that a hill?" said the younger, pointing to the Elfin Hill. "We should call it a hole in Norway."

"My boys," said their father, "a hole goes in and a hill stands out. Have you no eyes? Take care, or people will think that you are badly brought up."

They all entered the Elfin Hill, where the select company were assembled. The merman and other sea-folks sat in great water-tubs, and they declared that they were quite at home. All behaved perfectly except the two young men, who put their legs on the table.

"Feet off the tablecloth!" said their father. They obeyed but slowly, and then performed many other rude tricks.

But the old goblin was very different, and spoke pleasantly about the stately rocks and foaming waterfalls of his home. He told of the clear winter nights, the sleigh-bells, and how the boys run with torches over the smooth ice. He described everything so vividly that all his hearers felt that they could see everything—the saw-mills going, the men singing, and the maidens dancing.

Then the elfin girls were asked to dance, and they danced with stamping feet, and ended by flying about like the shavings in a saw-pit, so that some of the company became giddy.

"Stop!" cried the old goblin. "Is that the only housekeeping they can do? Can they do nothing more than dance and make a whirlwind?"

"You shall soon see," replied the elf-king, and he summoned his youngest daughter. She put a white chip of wood in her mouth, and vanished immediately. The goblin said that he should not like a wife of his to be able to do this.

Another daughter made a figure follow her like a shadow, which no goblin ever has. The third had learned in the brew-house of the moor witch how to make elf-puddings with glow-worms.

"A good housewife," said the old goblin, and smiled at her. Then came the fourth daughter carrying a large harp, and when she struck the first chord everyone lifted a leg, and at the second all had to do what she wished.

"She is a dangerous woman," said the old goblin; and his sons walked out, for they had had enough of it.

"And what can the next daughter do?" asked the old goblin.

"I have learned all that is Norwegian," she replied; "and I will never marry unless I go to Norway."

But her youngest sister whispered:

"That is only because she has heard in a song that when the earth decays the cliffs of Norway will remain, and she wants to get there and be safe."

"Ho, ho!" laughed the old goblin, "is that what she means? What can the seventh and last do?"

"The sixth comes before her," said the elf-king; but the sixth daughter would not advance a step.

"I can only tell the truth," she said. "No one cares for me, nor troubles about me; and I have enough to do to look after myself."

So the seventh came forward, and she was able to tell stories, as many as one wished on any subject.

"Now, here are my five fingers," said the old goblin; "tell me a story for each of them."

She took him by the wrist and told him stories so that he laughed until he almost choked.

"Hold fast on to what you have!" cried the old goblin. "This hand is yours; for I myself will marry you."

Then she said that the stories about two of the fingers had not yet been told.

"We will hear those tales in the winter," said he, "and also about the fir-trees and the beech-trees, and ghost stories, for no one in Norway can do it so well. But where are my sons?"

They were chasing the will-o'-the-wisps, blowing out their torches.

They said they had no wish to marry, and lay down on the table to sleep. But the old goblin exchanged boots with his bride, as the custom was, and danced about with her until cock-crow.

The hill then closed up, and the lizards said one to another:

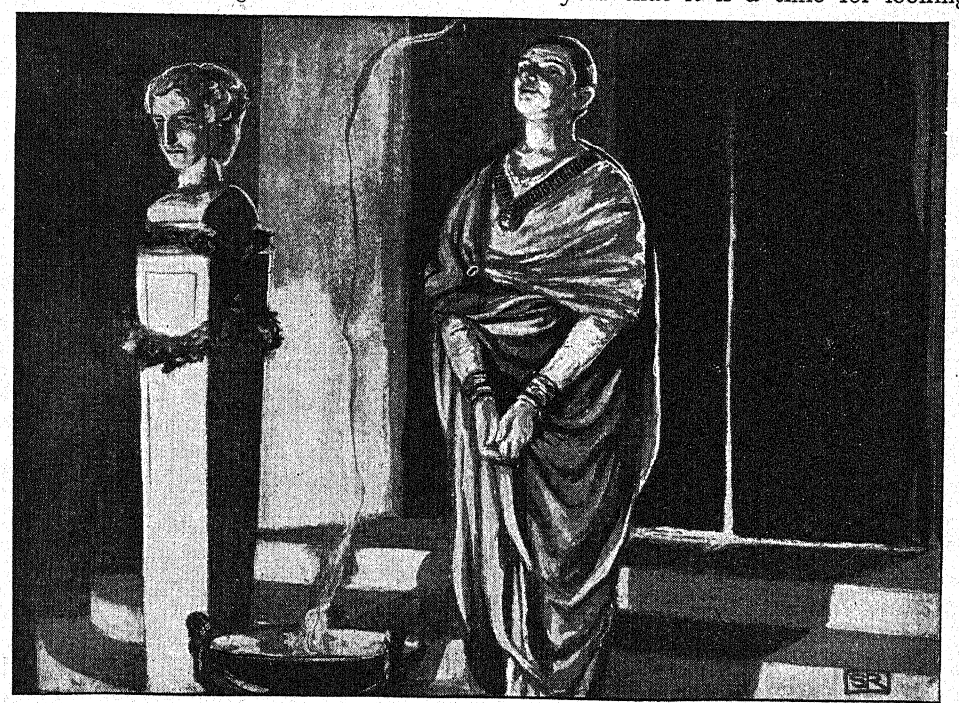
"How delightful was the old goblin!"

"His sons pleased me more," said the earth-worm; but, then, that poor, simple creature was quite blind.

THE STORY OF THE MONTHS

JANUARY; FEBRUARY; MARCH; APRIL; MAY; JUNE; JULY; AUGUST; SEPTEMBER; OCTOBER; NOVEMBER; DECEMBER

ALL the gods are dead. Centuries have rolled away since men believed in them. And yet the memory of these old gods and goddesses are enshrined in many forms, and will endure to the end of time. So deep was the faith of the Romans in their gods that throughout the world the names and characters of these mythical persons are associated with some of the most sacred and some of the most practical affairs of modern life. Some of the ghosts of the dead gods even haunt the months that make up the total of the Christian calendar. Let us imagine that we are witnessing a pageant of the months.

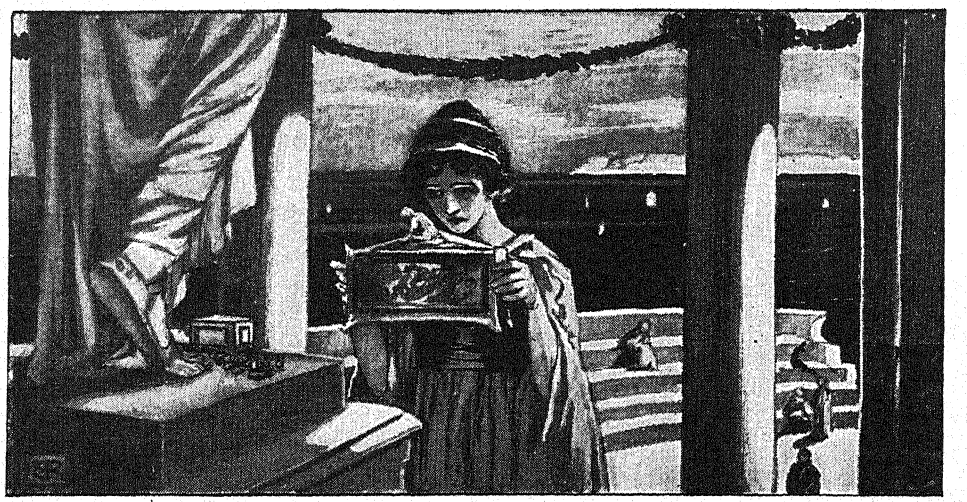


THE ROMANS NAMED THE FIRST MONTH JANUARY, AFTER THE TWO-FACED GOD JANUS

First would come a strange figure, a god with two faces, a god who looks forward and who looks back, and who carries in his left hand a key. This is Janus. The Romans worshipped Janus in a temple that was kept open during war, but was closed in times of peace. He was the god of Beginnings and Ends. The pious Roman who wanted to begin a matter well, or to make a good end of something, implored the assistance of Janus. This god was also the doorkeeper of heaven, and the Romans regarded him as the protector of their gates and doorways. His temple had twelve doors in it, just as the year has twelve months.

It was a clever idea of the Romans to name the first month of the year after Janus, because he suggests looking forward and looking back. Everyone who thinks at all feels at the beginning of a year that it is a time for looking back on the past, and also a time for looking forward to the future. It is a month of beginning and a month of end.

The second figure in our pageant is February, a month set apart. At one time February was the last month in the year, but 450 years before Christ it was placed after January instead of before, and became the second month. In England and her colonies, March was reckoned as the beginning of a year, and so February once again became the last month. Now it has settled down to its second place. But every four years

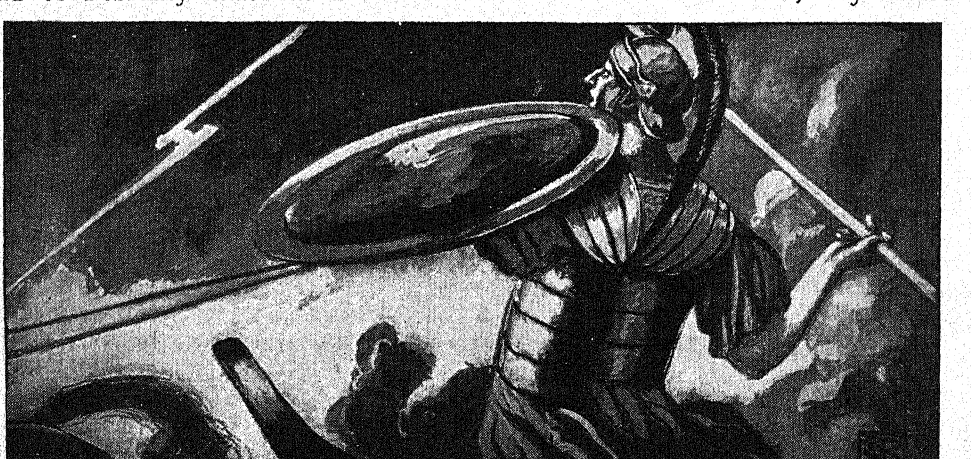


FEBRUARY COMES FROM A ROMAN FESTIVAL WHICH WAS CALLED FEBRUA

February has one day added to its twenty-eight, and so it remains, the most restless and unsettled month in the calendar. This extra day is added because a full year consists of 365 days and nearly six hours. At the end of four years these odd six hours have mounted up to almost a whole day of twenty-four hours; it is given to February to make up for its short allowance of twenty-eight days. But the year that marks the century, as 1900, is not a leap year unless it can be divided by 400.

The name February comes from a Roman festival of purification named Februa, in honor of the god Lupercus. The figure that passes before us in the pageant suggests cleansing and purifying. In our own time it is towards the end of February that the house-wife thinks about her spring cleaning. The Romans regarded Februa as a festival for spiritual cleansing, but they celebrated the occasion by over-eating. The third figure in our pageant clatters by in a chariot which is drawn by two horses, named Terror and Flight. It is a mighty and threatening figure, brandishing a long spear, lifting a gleaming shield to heaven, and raising its head on high, so that the lightnings play about the great helmet. This is Mars, the god of war.

To the Romans, Mars was more than a mere fighter; they regarded him as a god who could do almost anything, because he was so strong. They prayed to him for rain, and consulted him in their private affairs, offering on his altar a horse, sheep, wolf, magpie, or vulture. When soldiers went to war, they carried



MARCH, THE NOISY, BLUSTERING MONTH, NAMED AFTER MARS, THE ROMAN GOD OF WAR



APRIL, WHICH OPENS THE GATES OF SPRING, WAS CALLED "THE OPENER"

with them a cage of chickens sacred to Mars, and before battle they would offer corn to these sacred birds, eagerly watching to see if the food were greedily eaten or rejected; if the former, it meant that Mars was on their side, if the latter, that the day would go ill with them. Mars was associated in their minds with thunder and lightning, and yet the Romans believed that the woodpecker tapping the trunk of a tree was the answer of this blustering, noisy god to their prayers. March is very often a noisy, blustering month.

How different is the fourth figure in our pageant! It is not a god and not a goddess. It is the Angel of Spring. Gracious, exquisite, tender, and kind, April follows behind the dust of Mars' bloodstained chariot, sprinkling the earth with soft showers, and calling up in the ruts and gashes made by the fiery wheels flowers so slight, and pretty, and delicate that one almost weeps to see them. April is "The Opener." The Romans saw that this month opened the gates of birth and restored to life all those lovely and gentle things which had hidden in terror from the blasts of winter. "Omnia aperit!" they exclaimed in admiration; which means, "It opens all things." And so this month of beauty and new birth,



MAY IS CALLED AFTER THE GODDESS MAIA, DAUGHTER OF ATLAS, WHO UPHELD THE WORLD



JUNO, WHO RODE IN A CHARIOT DRAWN BY PEACOCKS, GAVE HER NAME TO JUNE

when the earth wakes from its winter sleep, when the buds appear on the branches, and the woods are filled with song, is called April—"The Opener."

Behind April comes the goddess Maia. Her father was named Atlas, and it was supposed that the weight of this vast round world on which we live, with all its mountains and oceans and deep mines, rested upon the shoulders of Atlas. He had seven daughters, who lived in a mountain, and Maia was the most famous of all these seven daughters because of her son, Mercury, who ran swiftly from heaven to earth on errands for the gods and goddesses. Jupiter, the father of all the gods, took Maia and her sisters and placed them near together as stars in the sky. The cluster of six stars called the Pleiades are supposed to be Maia and her sisters. The seventh star of the cluster is invisible. It represents one of the sisters who married a man named Sisyphus, and ever after, because poor Sisyphus has been condemned to roll a stone up a hill eternally, she has hidden her face with sorrow.

Two figures come next, disputing the sixth place in the pageant. One is the goddess Juno, and the other is a man, Junius. Some people think the month belongs to Juno, and others to the great Roman family of Junius.

We will let the two figures fight it out. Neither of them interests us very much. Juno was the beautiful but jealous wife



JULY, AT ONE TIME CALLED QUINTILIS, WAS RENAMED IN HONOR OF JULIUS CÆSAR



AUGUST WAS NAMED AFTER AUGUSTUS, THE FIRST OF THE ROMAN EMPERORS

of Jupiter, who drove about in a chariot drawn by strutting peacocks, and Junius was a proud and haughty man, without modesty, humility, or sweetness. These two contend for the brightest and grandest place in the calendar, the month of roses and garden glory. Whichever wins in this contention, we shall call June the month of God. We feel no admiration for the goddess or for the man; our hearts are rejoiced by the splendor of summer, and we give the glory of June to the Giver of all beauty and all joy—the mighty God who is also our Father.

The seventh figure in the pageant is one of the greatest men who ever lived, a soldier and an emperor, Julius Cæsar. When the year began with March, this month was the fifth, and the Romans called it Quintilis, which means the fifth month. Julius Cæsar not only conquered nation after nation, and not only made wise laws and wrote immortal books. He also set himself to reform the calendar, which at that time was in a sad state. The weather and the months did not agree. Spring came in January and winter in September. The month Quintilis was named in his honor.

It would take far too long to tell the story of Julius Cæsar, but we must remind ourselves, before he passes on, that he it was who invaded Britain and first taught the barbarians of that island to respect law and to desire civilization.

After Julius Cæsar follows his grandnephew Augustus. At first he was called Octavius, and ruled the Roman Empire with Mark Antony and Lepidus. Finally he became sole emperor, and did much that added to the glory and power of his magnificent empire. The people,



THE NAME OF SEPTEMBER MEANS SEVEN, AND IT WAS AT ONE TIME THE SEVENTH MONTH

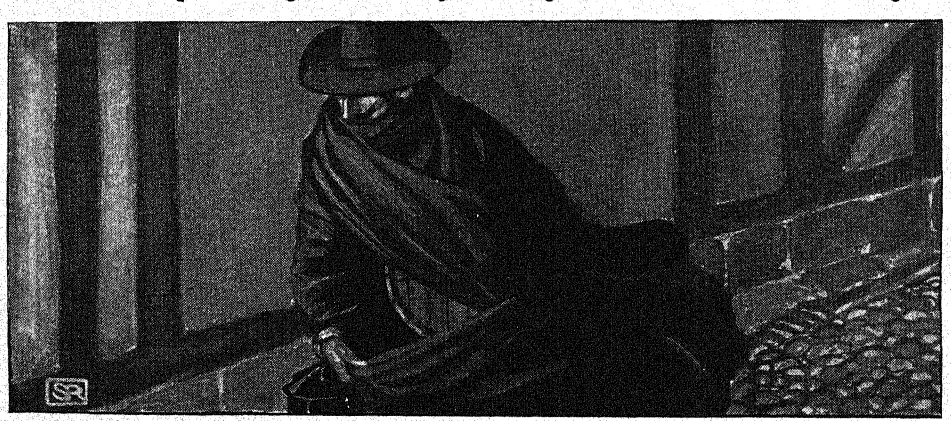


OCTOBER IS THE TENTH MONTH, BUT AT ONE TIME IT WAS THE EIGHTH, AS ITS NAME MEANS

anxious to flatter him, changed his name to Augustus, meaning noble. Then they called the eighth month August.

But July had thirty-one days, and August only thirty. The Romans thought that Augustus would be jealous of Cæsar's extra day, and so they took a day from February and tacked it on to the end of August. It is easy to remember that July and August have each thirty-one days by thinking of the two great Roman emperors. The eighth month was chosen for the reason that Augustus celebrated the chief events of his life during that time. It was in August that he was made consul, ended his wars, and conquered Egypt. Augustus remains for us a splendid figure in history. His reign was called the Golden Age, for not only did he bring peace to the war-tired world, but, under his patronage, literature and art flourished exceedingly.

The immortal poets, Horace and Virgil, lived at this time, libraries were built, agriculture developed, and temples and buildings rose up on every side in all the magnificence of marble. And it was in the reign of this mighty emperor that far away in Syria the Holy Child was born, whose reign has not yet ended, and whose birth has divided time. Little did the proud Roman emperor imagine, as he boasted in his palace of how he had found Rome made of brick and had left it of marble, that a Child was then living who would divide all the ages of



NOVEMBER, THE MONTH OF GUY FAWKES, WAS FORMERLY THE NINTH MONTH

the earth, and set a Cross between the reign of Augustus and the march of a new religion.

Behind the mighty Augustus in our pageant follows only a shamefaced figure VII. It is shamefaced because it knows that it has no right to be where it is.

September is the ninth month of the year, and to call it Septem, which means seven, is quite wrong. But our friend VII. raises a glance of appeal, and seems to say to us: "Do not turn me out. I at least serve one useful purpose; I remind you of the distant past when the year began with March, and when the month following August was in very truth the seventh of the year." But we cannot help smiling, for we think though the calendar has been changed several times since, so great a hold had these old names laid upon the world that they were allowed to pass.

Again comes a figure—IX., meaning ninth month, or, as we say, November, although it is the eleventh. English children see this figure passing along disguised under a heavy cloak and a wide-spreading hat, with a barrel of gunpowder tucked under its arm, for November, to a great many English children, is the month of Guy Fawkes.

Our Saxon ancestors called it "Blood Month," because it was at this time they slaughtered many cattle to last them through the dreary months of winter.

Last of all comes another shamefaced figure—X. How strange that



DECEMBER, THE MONTH OF FATHER CHRISTMAS, IS THE TWELFTH, BUT MEANS THE TENTH

of people who date their letters like this—5/9/09, and wonder if they ever reflect upon the absurdity of making 9 stand for September, which simply means 7.

After VII. comes neither god, goddess, nor emperor, but another figure—VIII. Here again is the same shamefaced look and the same appeal to antiquity. Many things as false as the name October are allowed to pass in the world, on this same score of antiquity. People dislike altering things; they are too tired or too careless to touch the monuments of the past. The Romans, when they had given the name of their great emperor August to Sextilis, the sixth month, felt that no one would be worthy to have a month named after him, and so let the old simple titles stand—September for the seventh, and October for the eighth month. Even December, which is Latin for ten, should be the name for our twelfth month. But, of course, we know now that at one time this was not the last, but the tenth month in the calendar. December, which seems to us to mean the end, or the last, means simply the tenth. However, we don't bother our heads about the origin of the name when December comes; we can see coming towards us another and more cheerful figure. Big, happy, genial, and generous, comes Santa Claus, or St. Nicholas, through the snow, riding over the hills, with his inexhaustible sack of toys. The gods and goddesses have departed, the Roman emperors have strutted out of sight, and the scene is filled by this jovial Dutch figure, the good and affectionate Santa Claus, who ends up the pageant with a royal cheerfulness and a divine humanity.

THE TIMID HARE

ADAPTED FROM THE JATAKAS

A HARE lived under a young palm-tree. One day, after his noon meal, he lay down under the tree. Suddenly he thought: "If the world should be destroyed, what would become of me?" At that very moment a large nut fell with a thud on a palm leaf. The loud noise in the tree above him startled the hare and he jumped up, exclaiming:

"This solid earth is breaking up! This solid earth is breaking up!" And without stopping to look around, he fled as fast as he could run.

Another hare saw him scampering off, and said: "Why are you running so fast?"

"Pray don't ask me," he gasped.

"What is the matter?" asked the other, running after him.

Then the hare stopped a moment and, without even looking back, cried: "The earth is breaking up." At this the second hare ran after the other. Other hares saw these two running, and all joined in the chase until one hundred thousand hares were fleeing together as fast as they could scamper along.

The deer, the bear, and the buffalo saw them, and asked the cause of their flight. On being told that the earth was breaking up, they, too, took to flight. The monkey, the tiger, and the elephant saw this bewildered herd dash by, and they, too, joined the frightened host.

When the lion saw this multitude of fleeing animals, he roared:

"What is the matter? What has frightened you?"

"The earth is breaking up!" said they.

The lion said to himself: "I am sure the earth is not breaking up. Maybe some one heard a sound that made him think so. I must find out what it was. I must stop this headlong flight, or they will all perish."

So with great leaps and bounds, he dashed ahead of them and reached the foot of the mountain first. He roared three times. They were terribly frightened when they saw the lion, and, stopping suddenly in their flight, stood all huddled together. The lion walked calmly among them and asked why they were running away.

"The earth is breaking up!" they answered.

"Who saw it breaking up?" asked he.

"The elephants know all about it," was the reply.

He asked the elephants.

"We don't know," said they; "the tigers know."

"We don't know," said the tigers; "the monkeys know."

And so on until the hares were questioned.

"This one told us," said they, pointing to a particular hare.

"Is it true, sir," said the lion, "that the earth is breaking up?"

"Yes, sir, I saw it," was the answer.

"Where?" exclaimed the lion.

"In a grove of palms mixed with nut-trees," said the hare.

"As I was lying under a palm sapling, at the foot of a nut-tree, I thought, where shall I go if the earth should break up? At that very moment I heard the earth breaking up, and I fled."

"Jump on my back," said the lion to the hare, "and we will return to the place of dreadful sound." Then he sprang forward and soon reached the palm grove.

"Now, friend hare," said he, "show me the place you meant."

"I dare not, my lord," was the answer.

"Come, don't be afraid," said the lion.

"Yonder, sir, at the foot of the nut-tree," called the hare, standing afar off.

The lion went to the foot of the nut-tree and there, in the exact spot where the hare had been lying, he found a ripe nut.

"The earth is not breaking up here," he exclaimed, "but that nut must have fallen with a thud on the palm leaf and scared the hare. Now I see the cause of all this disturbance."

With the hare on his back, he hastened back to the animals and told the whole story.

"Go back to your homes," said he; "the next time you hear of danger, be sure to find out exactly what it is before fleeing from it."

THE NEXT STORIES ARE ON PAGE 4677.



These pictures show an ancient Egyptian potter carrying out the different processes of his trade.

HOW CHINA CUPS AND SAUCERS ARE MADE

CONTINUED FROM 4461

AMONG the most useful of the familiar things of our daily lives are the crockery cooking utensils which we use so freely in our kitchens, and the prettily decorated dishes which make our dining tables so fresh-looking and attractive. Just because they are so commonly used, and because they are so easy to get, we seldom stop to think how they are made, or whose inventive mind first thought of fashioning an earthen vessel. And yet, the manufacture of the pretty cup and saucer, or the simple blue and white jars which help to make the kitchen bright and homelike, and the materials of which they are made, have a long romantic history behind them.

Part of the material has come from the foundations of the earth itself. Millions of years ago mountains of granite or similar stone were formed. In the ages that have long passed away the material of which these mountains were made was separated into its parts, and made into powder by hot gases, or by the weather, and this powder was carried down and settled on low-lying lands, to form the fine white clay, called kaolin, without which none of our beautiful fine porcelain can be made. It is not, however, necessary to use this clay in the making of all earthenware or pottery. Some very good pottery is made from fine, colored clays, and a great deal of coarse earthenware is made from clays which, although they will not make fine pottery, are still plastic, that is, the clay can be molded or modeled.

The making of pottery is the oldest of the arts known to man. It is so ancient that no one knows what people first learned to make vessels of clay. In our great museums we may find well shaped bowls and vases which were buried in the tombs of the Egyptians perhaps six thousand years ago, and which have helped us to learn something of the state of civilization in Egypt, two thousand years before the time of Moses. The ancient Cretans and the Greeks made wonderfully beautiful jars and vases thousands of years ago. The Assyrians and the Persians were noted for skill in this work, and Roman pottery has been found everywhere within the limits of that great empire. The Egyptians knew how to make a beautiful glaze for their pottery thousands of years ago. It is thought that they were the first people to learn this art, and that it was taught by them to the Babylonians and Assyrians. It is believed that the Greeks knew nothing about glazing, for though their vases have a fine gloss, they are not glazed.

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THE MAKERS OF POTTERY IN THE MIDDLE AGES

As we have learned in other places in this book, the civilization of Greece and Rome was almost swamped for a time by the rush of barbarian peoples from the north. These peoples knew little about the making of pottery, and the potter's work that was done in Europe in medieval times was very crude. The knowledge which had been gained during hundreds of centuries by the Egyptians, the Greeks, the Assyrians and Persians had not been lost, however, for it lingered on among the Egyptians and Syrians. After the Moslem conquests the art was revived, and beautiful pottery was made by some of the Moslem peoples.

When the Moors overran Spain, they brought with them skilled workers in various crafts, among whom were potters. Knowledge of the art of these Moorish potters soon spread through Europe. Potters of other nations were quick to learn it, and improve upon it, and soon potteries sprang up in other countries. Many beautiful things were made, especially in Italy, but they were made from heavy clay, and the "paste," under the beautiful decorations and fine glaze, was thick and coarse.

THE CHINESE WERE THE FIRST MAKERS OF FINE CHINA

Long before this time the Chinese, working by themselves, had learned to make very beautiful pottery. In their search for fine clay, they discovered deposits of kaolin. From this they made fine porcelain, as early, probably, as the time during which the Norman kings reigned in England, and when Chaucer was riding to Canterbury with the pilgrims, Chinese potters were making the exquisite wares for which kings' ransoms are paid with cheerfulness to-day. The Chinese taught the art to the Japanese, and no other people have yet been able to outdistance these nations in the making of fine porcelains.

CHINESE PORCELAIN WAS BROUGHT TO EUROPE AND IMITATED

It is said that Chinese porcelain soon found its way to Western Asia and Northern Africa and that it was brought to Europe from Cairo as early as the twelfth century. Eager efforts were made to imitate it, but for a long time they were not successful. The trouble was that the European potters did not know what clay it was that gave the Chinese porcelain its beautiful whiteness and clearness. It was not until the year 1710 that it was discovered by a chemist named Böttger, who found it, it is said, in the clay used to whiten his wig. Böttger lived at Dresden but afterward moved to Meissen, where the famous Dresden china is still made. He tried to keep his discovery secret, but in vain. In a few years porcelain was made in other countries of Europe and French and Austrian porcelain also became famous. It received its common name of china because it was first made in that country.

Before the end of the eighteenth century, a new kind of porcelain was made in England. One experimenter found that powdered flints made an excellent addition to the kaolin and other materials used. Another got the idea of adding to the mixture a white powder made from burned or calcined bones. It was found that in this way a beautiful soft paste could be produced, and this English or "bone china," as it is frequently called, proved so satisfactory, and could be made so cheaply, that its use soon spread. It is now made in large quantities in Europe and is also made in America.

BEAUTIFUL PORCELAIN IS MADE IN THE UNITED STATES

For a long time the china made in the United States was all of a heavy kind, but since the end of the last century, great advances have been made. A great deal of pretty porcelain and good earthenware is now made in the states in which suitable clay is found. Several potteries are famous for the beauty of their vases, jars and lamps, and some of the fine American bone china for table use is equal in beauty and excellence to the finest porcelain made in the Old World. American potteries are chiefly noted, however, for large articles for household use. The glistening white ware that makes our bath rooms a delight, wash tubs and other things that make life easier for the housekeeper, are made in many places throughout the country.

In the middle of the last century, Henry Doulton, a famous English potter, devised a way to make the earthenware drain pipes which are of so much use in carrying off poisonous matter and making our towns and cities healthful and comfortable. The new invention proved to be

a boon to the world, and great potteries are now engaged in making immense numbers of these pipes. Until they came into use, the best drains were built of brick, which allowed the sewage to leak through and spread its poison in all directions.

How the Clay Is Made Ready for Use

Many things happen to the clay after it has been taken out of the ground, before it is ready to make a dainty cup and saucer or a graceful vase or any of the numberless things for which earthenware is used. To take out any sand that may be in the clay, after it is quarried, it is mixed with water and strained through a fine sieve into a tank where it is allowed to settle, and the water is drawn off. The clay is then put into filters, the water is pressed out and the clay is ready to be shipped to the pottery. It is not yet ready for the potter, however, and the processes through which it has to go depend upon the use to which it is to be put.

To make fine bone porcelain, the kaolin is mixed with feldspar and with powder made from powdered flints and burned knuckle-bones of sheep. Water is added to the mixture and it is ground and beaten and turned over and over by machinery, for days, until it is a smooth creamy paste or "slip," and so plastic that it can be molded into any shape. When it has reached this state it may be used at once, or it may be filtered and pressed again, and folded away in a dark place for later use. Some potters put it through still another mill to press out any air that may be in it. In hard porcelain, such as the Chinese make, no bone is added, and in this case larger proportions of some of the other materials are used.

How Porcelain Is Made from the Clay

Valuable vases, and many other things, are still made on the potter's or throwing wheel. This is a contrivance which was probably used in Egypt 6,000 years ago and has been very little altered in principle since. The potters of Babylon and Nineveh used wheels very much like it, even before the Bible was written. The throwing-wheel is a disc which revolves horizontally in a pan. The pace at which it moves is fixed by a brake which the potter controls. The wheel is still sometimes worked by the potter's foot, but most of the wheels used in large potteries are worked by machinery, and some of them by electricity.

As the throwing-wheel spins round on its axle, the potter throws the clay, which sticks to the wheel and goes round with it. Then the art of the potter comes into play. As the wheel spins he presses and pulls and molds it with his skilful hands or with tools made for the purpose. He works from the base upward, shaping the walls, making them the right height and thickness, and gradually the clay takes on the desired shape. When it is finished, the vessel is set aside to dry, so that it can be fixed on a lathe, and turned and smoothed.

Some plates, as we see in the picture, are made on a wheel. Others are made in a mold which the potter fixes to his throwing-wheel. This mold, filled with clay, is spun round on the wheel, an arm presses down upon it, squeezes the clay to the shape of the mold, and then pares it down to the proper thickness. Heavy cups are also made in such a mold, or, in some places, are thrown on the wheel. Thin, translucent cups and bowls, however, are cast in porous plaster molds, into which liquid slip is poured until they are full to the brim. The water in the slip filters through the mold, leaving a thin lining of clay. After this has reached the desired thickness all the liquid slip that remains is poured off. The mold is then placed on a kind of wheel so that the inside may be worked into its proper shape. When this is done it is put into a warm place to dry, and out of the mold comes the cup, or perhaps a cream pitcher or teapot, ready for handles or spouts, which have been made in separate molds.

The Burning of the Clay Vessels into Porcelain

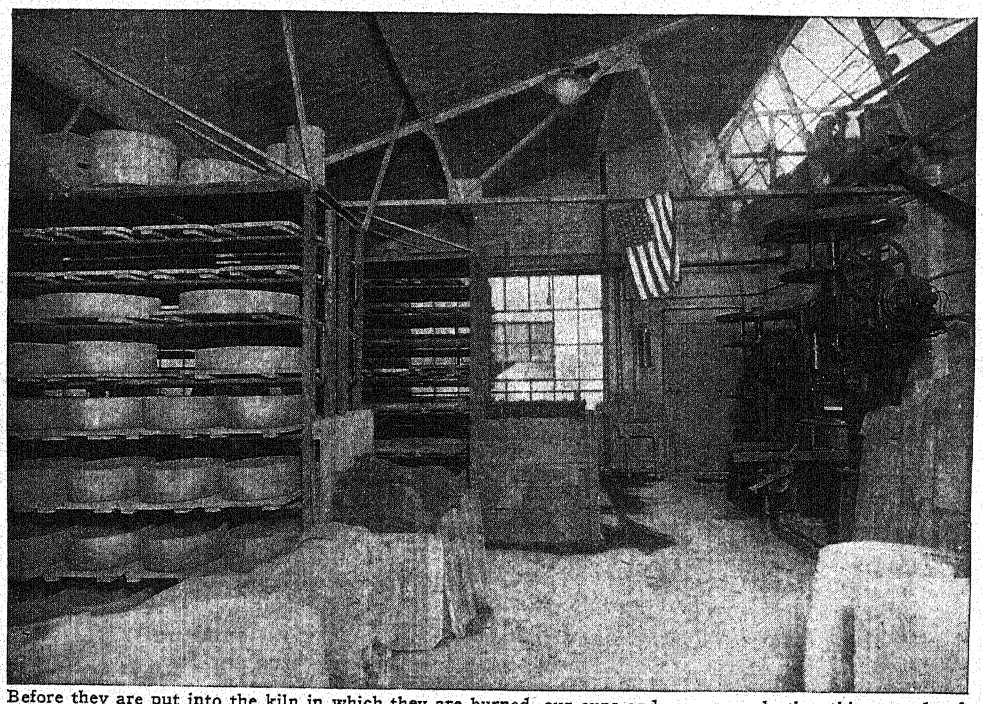
After the clay has been shaped, the vessels are put in a drying room, and then comes the difficult part of porcelain making, the firing or burning of the clay to make it into porcelain.

For this purpose, the china is packed into closed earthenware vessels called seggars, in such a way that they will not touch each other. The seggars are packed into the kiln and when it is full the openings are closed up with fire bricks. Then fires are lighted and the heat is carried up all round the seggars, at first slowly, and then more rapidly, until the inside of the kilns has reached

an almost unimaginable temperature. The kiln is kept at this temperature for about ten hours. It is then allowed to cool so gradually that it is three or four days from the time they were put in, before the seggars are opened and the "biscuit," as the china is now called, is taken out.

How the transparent glaze is made

Meantime in another part of the pottery a glaze has been made by mixing together materials which will make glass,



Before they are put into the kiln in which they are burned, our cups and saucers and other things made of china are packed in the earthenware vessels called seggars, which we see here. The machines in the corner press the clay from which the seggars are made into the shape that the potter desires.
Pictures on pages 4542, 4546, 4547, 4548 courtesy of Lenox, Inc.

and baking or firing them in the kiln until they become a solid piece of glass. This is ground up to a fine powder under heavy stones, and mixed with water to what is called the glaze "slip." Into this our cups and saucers are dipped so skilfully that every part is evenly covered with the glaze. They are then placed again in the seggars, and put back into the kiln. The furnace fires are relighted, and the temperature is again raised to a high point, and kept there for many hours, until all the materials in the glaze are well fused, and the porcelain is covered with a delicate, shining coat.

The china is now ready for the decorator, who paints on it flowers, or figures, or designs, if it is very good china. If it is of poorer quality, it is not painted; the designs are pressed on it from transfer paper. After it has been decorated, the china is again baked, or fired, to set the colors. Often the china is decorated before it is glazed, and we then speak of the decorations as being "under glaze." Many people buy plain white porcelain and paint and fire it themselves.

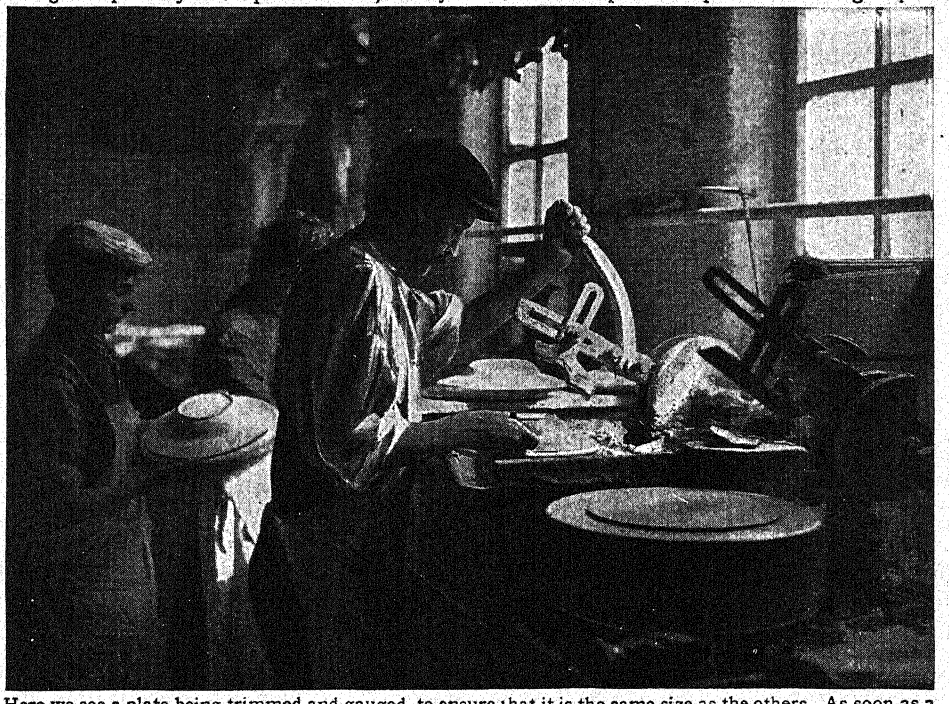
Some kinds of common earthenware are not dipped in glaze but receive what is called salt glaze. As soon as the heat of the kiln in which this pottery is being fired has cooled down to a certain point, the seggars are opened and a quantity of common salt is thrown in. The salt, which, as we have learned in another place, is sodium chloride, is turned into vapor by the heat. When in this state it divides into its separate parts, and as the oven cools the sodium settles down on the articles in the seggar in the form of a transparent glaze. Salt glazing is generally used in this country on heavy gray-blue ware, which we often see in cooking utensils and mugs.

THE NEXT STORY OF FAMILIAR THINGS IS ON PAGE 4590.

HOW THE DINNER-PLATES ARE MADE

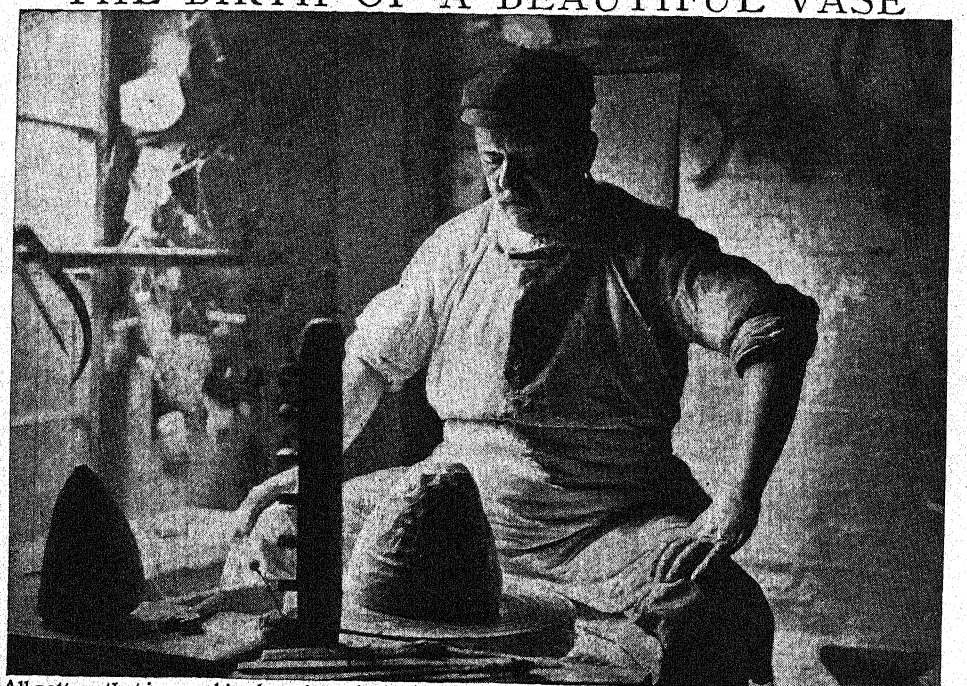


In making plates, a mass of clay is thrown on to the potter's wheel. It is then flattened to an even thickness all over, and molded to a pattern by a gauge which ensures absolute accuracy of size and shape. Here we see a rough lump of clay on the potter's wheel, while just in front of the potter is a plate that is being shaped.

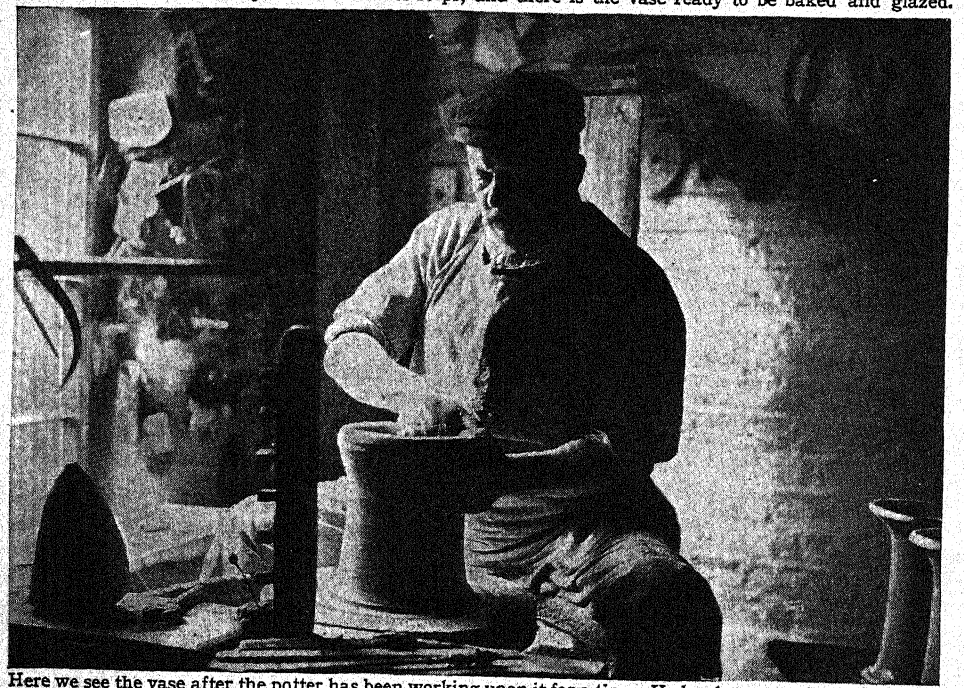


Here we see a plate being trimmed and gauged, to ensure that it is the same size as the others. As soon as a plate is shaped, it is taken by the boy on the left to the kiln. If we look at most plates, we shall observe three little marks on the bottom. These are caused by a little article, called a cockspur, which prevents the plates from touching when they are piled one above another in the seggars during the baking process.

THE BIRTH OF A BEAUTIFUL VASE

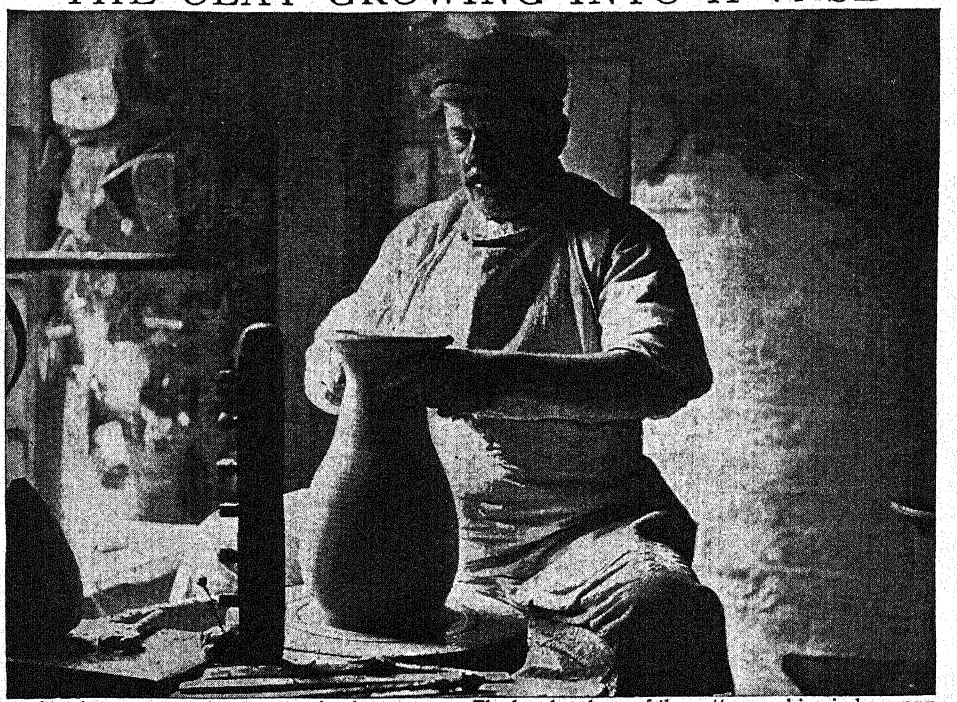


All pottery that is round in shape is made on the potter's wheel, and it is a wonderful sight to see the formless clay grow into a beautiful vase under the potter's skilful handling. As the wheel spins round and round, we see the clay gradually assuming shape. With a deft touch here and a slight pressure there, the potter gives character to the clay until the wheel stops, and there is the vase ready to be baked and glazed.

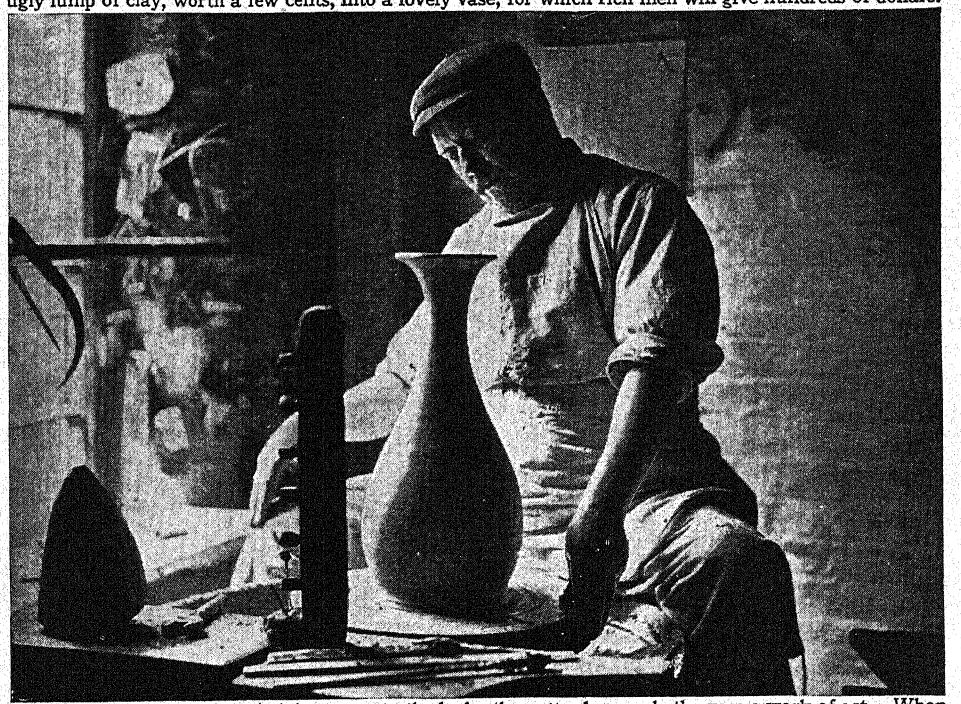


Here we see the vase after the potter has been working upon it for a time. He has begun to give shape to the clay. The potter's art is one of the oldest in existence, dating back into prehistoric ages. The earliest pottery was shaped without the aid of the potter's wheel, and was made of coarse clay. Simple means of decoration were employed, the potter often making a band of circles by impressing the clay with a hollow stick.

THE CLAY GROWING INTO A VASE

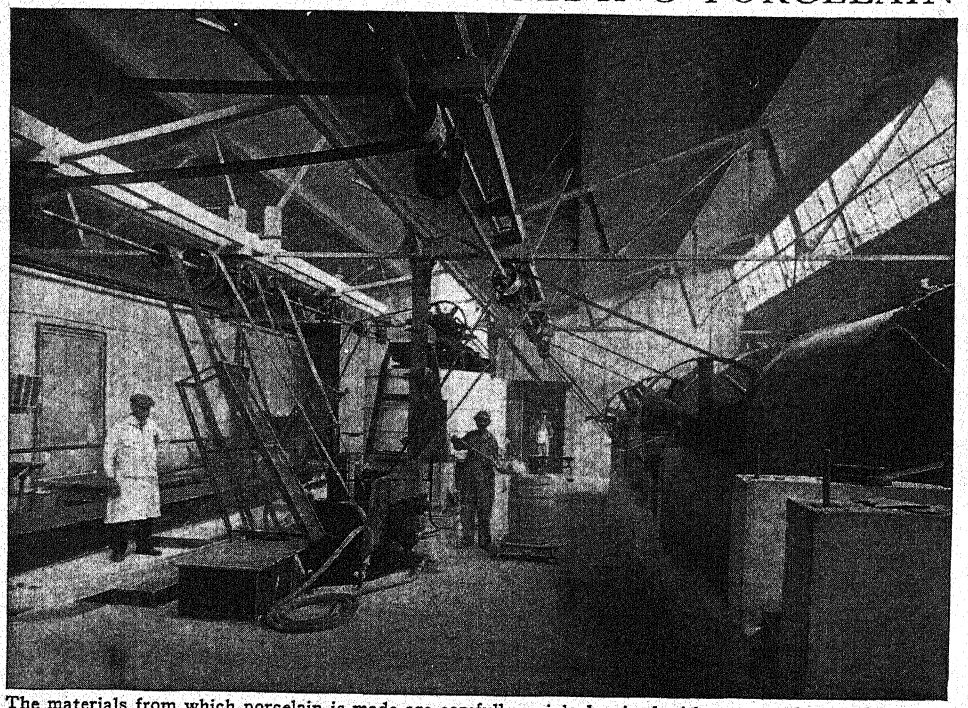


In this picture we see the clay growing into a vase. The hand and eye of the potter, working in harmony, produce beautiful lines and graceful curves. Sometimes the potter and the artist between them turn an ugly lump of clay, worth a few cents, into a lovely vase, for which rich men will give hundreds of dollars.

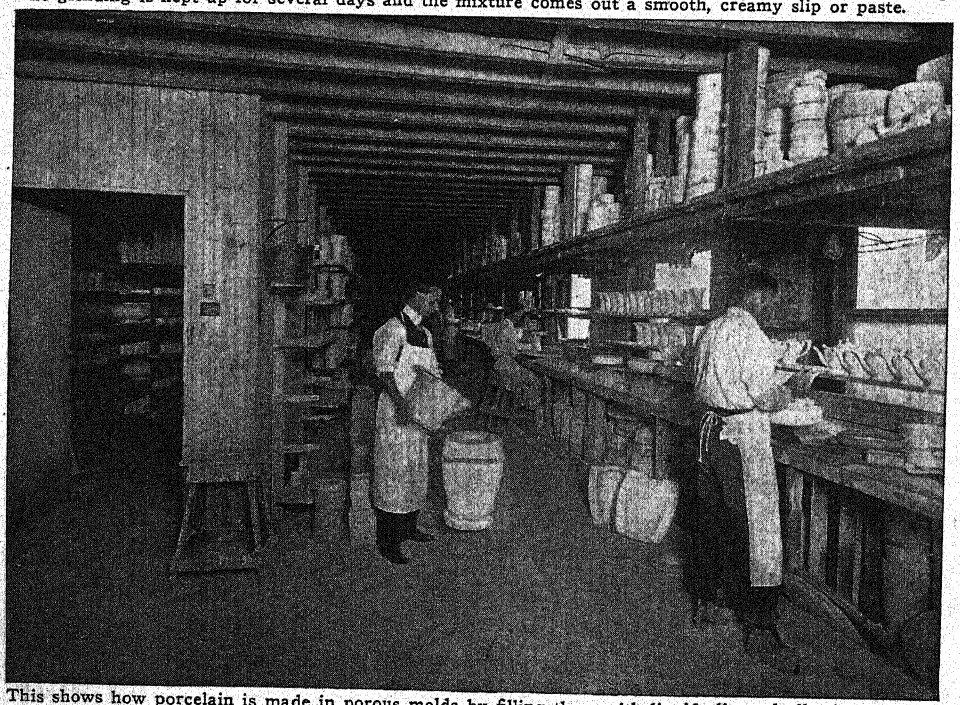


By lengthening the neck and giving grace to the body, the potter has made the vase a work of art. When this particular vase has been baked and glazed and painted, it will be worth a very large sum, and may grace a noble mansion or royal palace. A king of Prussia once exchanged some vases for a regiment of soldiers.

MIXING CLAY AND MOLDING PORCELAIN

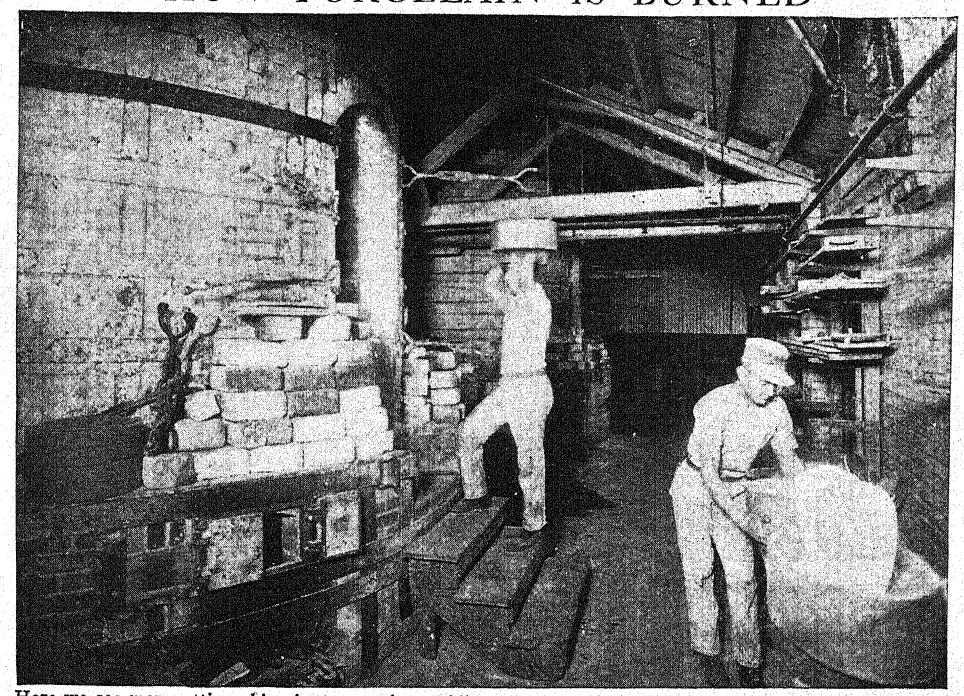


The materials from which porcelain is made are carefully weighed, mixed with water and ground in flint-lined steel mills. In each mill about a ton of large flint pebbles grind against the square flint blocks of the lining, and as the mill revolves, the china mixture is ground and beaten between pebbles and lining. The grinding is kept up for several days and the mixture comes out a smooth, creamy slip or paste.



This shows how porcelain is made in porous molds by filling them with liquid slip and allowing them to stand until a deposit forms inside. When the deposit has become sufficiently thick to make a vase or teacup, the rest of the slip is poured off, the inside is smoothed down, and the mold dried. It is then opened and the vase or teacup is ready for handles or handle, which have been made in separate molds.

HOW PORCELAIN IS BURNED

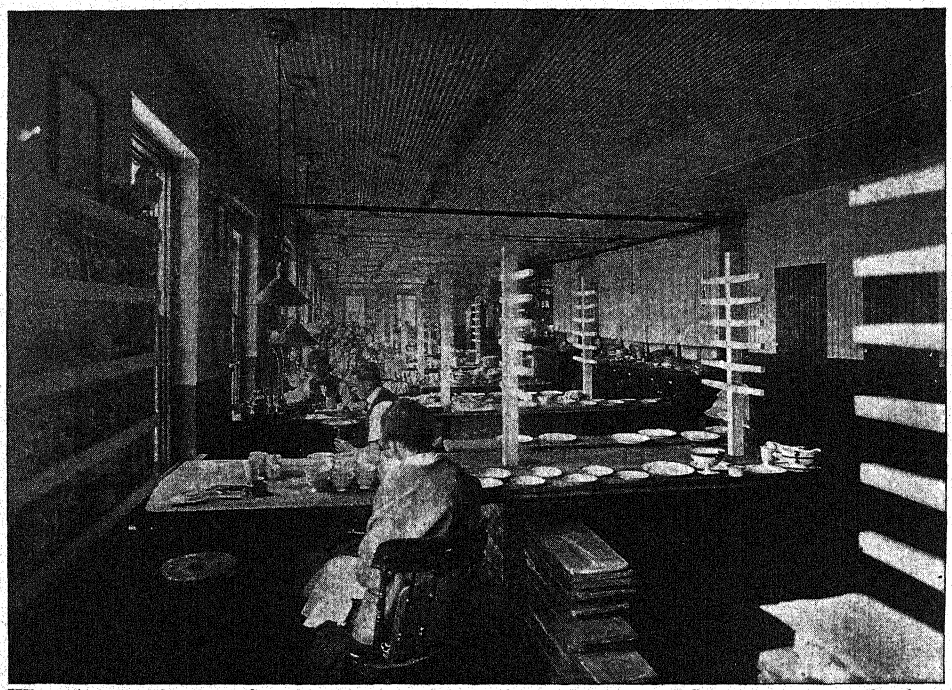


Here we see men putting china in seggars into a kiln to be burned. When the kiln is full the opening is filled with the bricks, which you see at the side, and clamped with iron bands. The firing process takes a period of from twenty to thirty hours, while twenty hours are required to cool off the kiln before the bricks are removed and the outer air is allowed to rush in. Great care and skill are required in the firing.

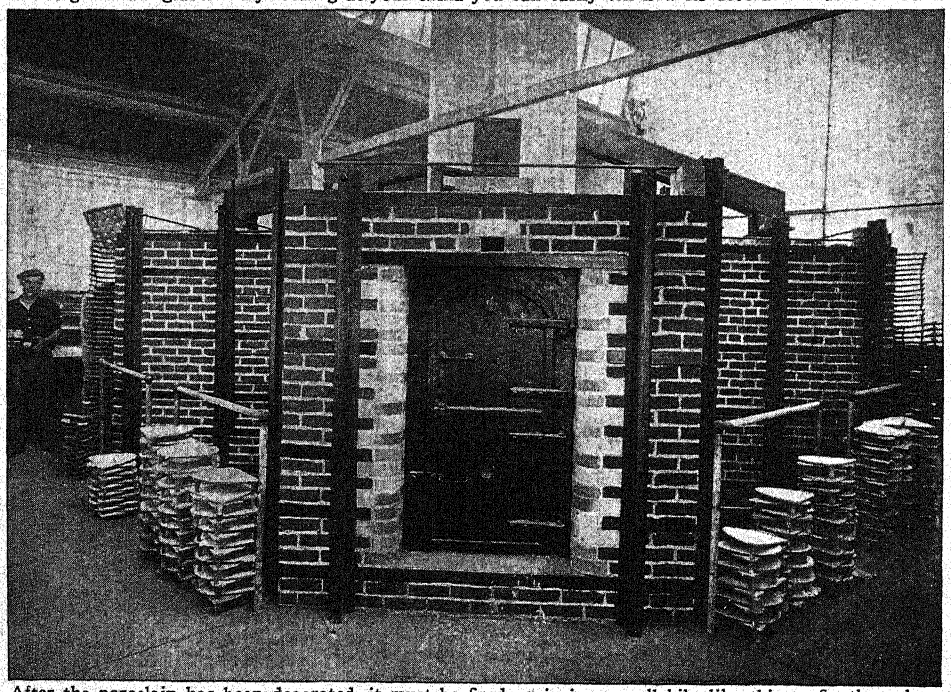


After the kiln has cooled, the china, now known as biscuit, is drawn out and cleaned to prepare it for the glaze, which has been prepared from materials which will make glass. Each object is evenly covered by skilfully dipping it in the glaze. The china is arranged in the kiln so that the things will not touch each other; the fires are relighted and the temperature is brought up to a point that will fuse the glaze.

THE DECORATION OF PORCELAIN



When the glaze has been fired, the porcelain is ready for the decorators. Cheap, heavy cups that have been made in a mold are decorated with transfers, but fine porcelain is painted with flowers or designs, or tinted all over. Often the china is decorated before it is glazed, and we then speak of the decorations as being "under glaze." By looking at your china you can easily tell how its decoration has been done.



After the porcelain has been decorated, it must be fired again in a small kiln like this to fix the colors. Nothing like the same degree of heat is needed, however, and so the kiln is not so strongly built. Just as much care must be used in this firing, as in the others, for the minerals used for the colors—cobalt, iron, copper, manganese, gold and so on—are of course strongly affected by the degree of heat used.



THE NEW PALACE AT POTSDAM, BUILT BY FREDERICK THE GREAT

THE STORY OF FREDERICK THE GREAT

CONTINUED FROM 4448

IT has been said that the history of Prussia is the history of the Hohenzollerns, its ruling family. This is largely true, and of no one is it more true than of Frederick II, whom we know as Frederick the Great. Before his time, the possessions of his house were scattered, and the country poor. He added to its wealth by seizing from Austria the rich province of Silesia, and began to link together his scattered territories by taking possession of the part of Poland which divided Brandenburg from Prussia.

Frederick, whose father was Frederick William, the eldest son of Frederick the first king of Prussia, was born on January 24, 1712. The coming of the little boy was a joyous event in the lives of his father and mother. They had already lost two little sons by death, and had only one child left, a girl named Wilhelmina, who was now five years old. When Frederick was born, his grandfather was still alive, but he died the following year. Frederick William, the boy's father, became king, and Frederick himself henceforth was known as Crown Prince.

Frederick William, who was a gruff soldier, brought his ideas of discipline into his own household, and his children were brought up very simply. For instance, Frederick tells us that his nursery fare included beer soup and bread, which, to our minds, made strange food for a little child. While he was still very small, Frederick was put in charge of Madame de Courelles, a gentle, gracious French woman, who taught him carefully, and gave him a love of the French language, and French people and manners, which lasted all his life. He was a bright, affectionate child, who loved his gentle teacher, and played and romped about the nurseries with his sister Wilhelmina. A picture, which was painted when he was three years old, shows him to us as a quaint little figure, in a velvet frock, beating a drum with one hand, while Wilhelmina holds the other. His delight in this drum gave his father the greatest pleasure. He thought it showed that the boy wanted to be a soldier and that was the dearest wish of the king's heart.

HOW FREDERICK'S EDUCATION WAS CARRIED ON

The happy days of Frederick's childhood lasted only until he was seven years old. Then the king thought it was high time that his education as a soldier and a king should begin, and put him in charge of three

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tutors. From that time on to the end of his life, Frederick's days were filled with work. His father, who did not believe in idleness, laid down very precise rules for every moment of his son's time. His tutors, two soldiers and a Frenchman, were given no freedom about his studies, for the king had very strong opinions about the subjects that a prince ought to study, and the time that should be given to each.

Latin the king thought was unnecessary. Therefore, the prince was not to learn it. German and French, said the king, were sufficient for his needs, and he was taught no other language. He was to learn arithmetic, mathematics, and economy. He was to pay special attention to the history of his family, and of the hundred and fifty years before his time; but he was only taught a general knowledge of ancient history. Later on he was to learn the science of fortification, and the formation of camps. Above all, said the king, his son's tutors were to impress on his mind the belief that nothing could bring a prince true honor and glory but war, and that if he did not love it, he would be despised by all men. This teaching, as we shall see, bore fruit later on.

At this time, the king made up a company of about a hundred boys of about Frederick's own age. He was drilled with these boys, just as if they were all grown men and soldiers, and a year or two afterward he was put in command of the company. When he was about nine years old, an arsenal of tiny guns was set up in one of the halls of the palace, and there, with a few of his friends, he was taught to mount guns, and fire the batteries just as if he were in actual warfare. This sounds as if it might be very good fun, but it was not fun to Frederick. It was hard work, and the discipline in his little company was just as strict as the discipline in the army. He had to get up at seven o'clock on Sunday, and six o'clock on week days. He was taught to wash and dress himself, and to teach him to be quick in his movements, he was given only fifteen minutes to dress, to say his prayers, and to eat his simple breakfast. Not many boys can move so quickly as all this, and perhaps his father had some excuse when he began to find fault with him, and call him a dirty boy.

FREDERICK'S UNHAPPY BOYHOOD AND YOUTH

Unhappily, Frederick William had very little patience with his son, and found fault with him for many reasons. The king had a very quick temper, and Frederick was afraid of his father and shrank from the violence with which he was treated whenever he did anything of which the king did not approve. His father resented the boy's fear of him. He wanted his love and confidence, and resented the affection that was shown by the boy to his mother and sister and his tutors.

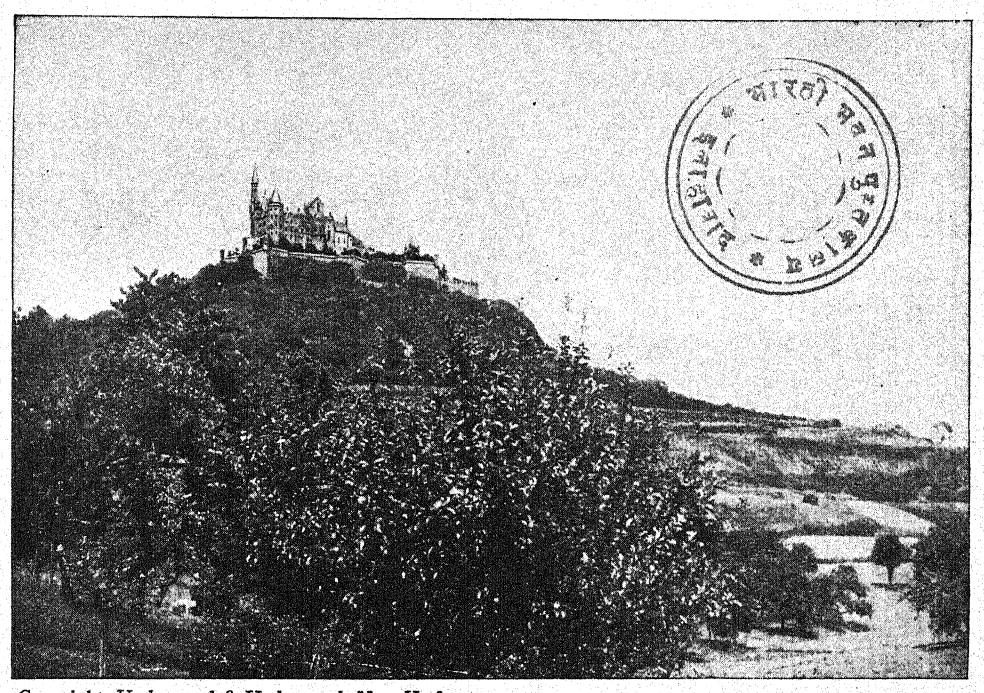
As Frederick grew older, the differences between him and his father increased. Frederick disliked hunting, which was one of his father's chief pleasures, and said that riding over freshly seeded ground was great waste. He wearied of the perpetual drilling that he had to undergo. He loved music and literature and had visions of being a poet. He was a handsome youth, and as he grew up, he developed a love of fine clothes, and rebelled against having nothing but his uniform to wear. On the other hand, his father thought that hunting was a manly sport, that time spent on music and literature was wasted, that it was an honor to wear the uniform of his army, and that love of fine clothing was womanish. The truth is that Frederick would have made a very bad poet, and never learned to write well in either French or German. He was a born leader of men, and was of the stuff of which, in our day, great captains of industry are made. At the same time, his love of music and literature was a great boon to him all his life, and if his father had understood that the prince was quite as safe in indulging his love for music as he himself was in making a hobby of creating regiments of very tall, rather useless soldiers, all might have been well.

But this Frederick William could not see. He loved his country, and had worked hard to make it prosperous and powerful. He feared that his son would grow up to be self-indulgent and useless, and would undo the work of his life. "Fritz," he said, "is a poet, and will spoil all my labor." The queen and the Princess Wilhelmina took the prince's part; the king grew more and more angry. Prince Frederick looked upon his father

as a mean, selfish tyrant, and life at the palace was very unhappy.

Unknown to his father, Frederick learned to play the flute, and one of his tutors taught him Latin. But the king found this out. He ordered his son's books to be sold, had the flute put out of the way, and with his own hands burned a handsome coat which the prince had bought.

As the prince grew to manhood, the quarrels between him and his father became more frequent. We have a very pitiful letter written by Frederick when he was about sixteen, in which he said that he had not ventured to see his father for a long time, chiefly because he "anticipated a worse reception than usual," and begged his father "to give over the fearful hate which had appeared so plainly in his whole countenance and to which," the poor boy said, "I cannot accustom myself." Much of the trouble, however, was Frederick's own fault. He made some bad companions, got into debt, and fell into wild ways, which the king, who was a really good man, thought were beneath the dignity of a man, and much more of a king. Frederick William always carried a cane, and in his anger and distress did not scruple at all to use it on his son's shoulders. At times he would scarcely speak to the prince. Often he would not help him at dinner, so that the boy had to leave the table hungry. It is said that more than once, the king flung plates at the prince's head, and that he even tried to hang him with a heavy window cord. Sometimes he covered him with abuse in the presence of others, and when the prince was silent under his taunts, accused him of cowardice.



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On this hill stood the castle where the Hohenzollerns lived in the days before they became burgraves of Nuremberg. The castle was allowed to fall into ruin, but in the nineteenth century was rebuilt by Frederick William IV of Prussia. Nothing of the old castle except the chapel remains, but the new building was designed to look as much as possible like the fortress of the old counts. The territory which surrounds it still belongs to the king of Prussia, and the castle is sometimes used by the royal family as a summer residence.

THE PRINCE ATTEMPTED TO RUN AWAY AND WAS IMPRISONED

At length Frederick felt that he could stay in his home no longer and made an attempt to run away. He was unsuccessful. The king had him arrested and imprisoned in the castle of Cüstrin, and tried by court martial as a deserter from the army. The court was compelled to sentence Frederick to death, and, in spite of the sorrowful prayers of the queen and

all his other children, and the indignation of the army and the country, the king threatened to have the sentence carried out. The emperor, however, pleaded for the boy, and this gave the king an excuse to change the punishment. Nevertheless, the friend who had helped the prince in his preparations to escape, was by the king's direction sentenced to death, and was executed before the prince's window. "Pardon me, dear Katte," the prince said as his friend was led past. "Oh, that this should be what I have done for you!" And Katte answered, "Death is sweet for a prince I love so well!"

Frederick, who from the time of his arrest had been very severely treated, did not know for months whether he was to live or die. He was dismissed from the army and his uniform was taken from him, but after he had taken an oath of obedience, and written a penitent letter to his father, he was released from his prison. He was not allowed, however, to leave the town of Cüstrin except with the permission of the commandant, and then only for a day, and was made to learn the business of governing the province in which he was confined. Then he set himself as he had never done before to gain his father's favor. He worked and studied hard, and made good use of his time, and the reports of his conduct were so good that at the end of a year the king let him go back to Berlin. He was taken back into the army and after a time was given command of a regiment and made governor of the province of Rüppin. The next year, to please his father, he married a cousin of the empress of Austria, the Princess Elizabeth of Brunswick-Bevern. Unfortunately he never really loved his wife, and though they agreed very well while they were young and gay, they seldom met in their later years.

The shock of Frederick's imprisonment and the death of his friend had been so great that he had become quite changed. He never afterward gave any one his confidence, and from being an affectionate boy, he turned into a cold, hard, selfish and ambitious man. Even his sister Wilhelmina, whom he really loved, complained of his changed manner, and while he was always loving and kind to his mother, she had no influence in his life.

Still, the years between his marriage and his father's death were the happiest in his life. He had a beautiful house, at some distance from Berlin, and though he had plenty of work to do, he had freedom to indulge his own tastes. The king's health grew poor, and as he saw that his son would make him a worthy successor, he learned to depend on him. During these years, the king sent an army to the help of the emperor, when the king of France invaded Germany. Frederick went with this army, and although he was not in command, his father was much pleased with his conduct.

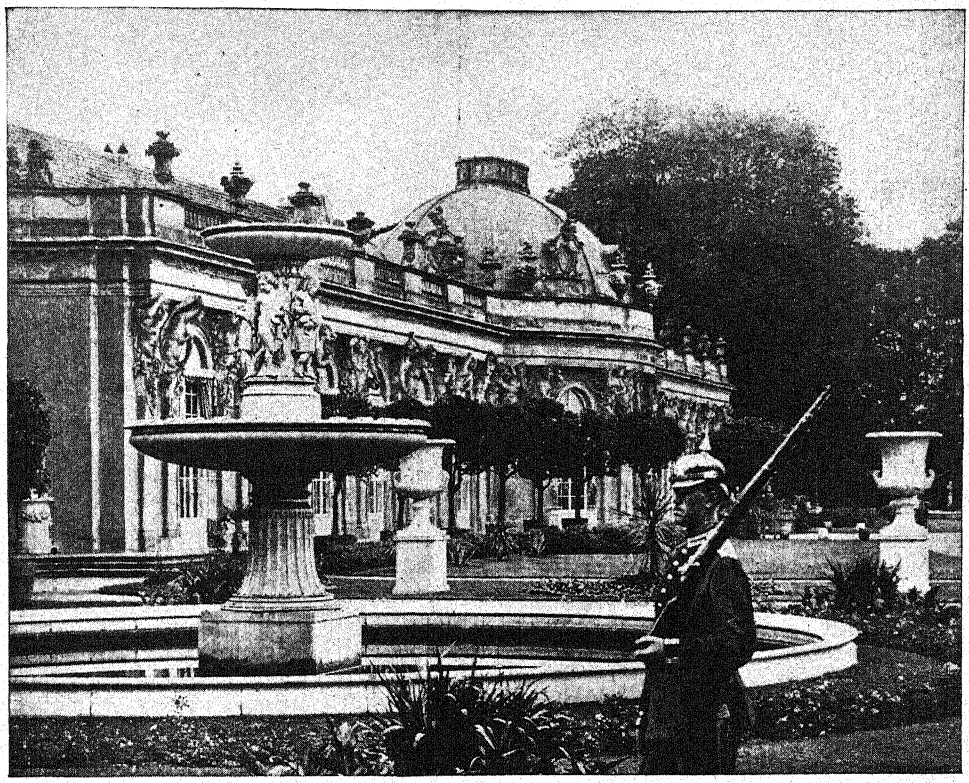
ON HIS FATHER'S DEATH, FREDERICK BEGAN TO REIGN

Frederick William died on May 21, 1740, and the prince succeeded him as Frederick II, king of Prussia, margrave and elector of Brandenburg, and duke of Cleves in Westphalia. Many people had thought that when Frederick ascended the throne he would make the court a scene of splendor, but in this they were disappointed. He contented himself with the simplest ceremonies on his accession to the throne, and spent the first months of his reign in getting the business of administration well in hand. He made no effort to change his father's way of government, and if anything, he made himself more absolute than his father had ever been. He never had a cabinet. He appointed three ministers, but they had no influence over the affairs of state, and simply carried out the instructions that he gave them.

We usually think of Louis XIV as the best modern example of an absolute king, but as a matter of fact, Frederick II of Prussia, who took counsel with no one, was more absolute than any king of France that ever lived. Nevertheless, he was perhaps as good a king as an absolute ruler could be, and gave a great deal of thought to the welfare of his people. As soon as he began to reign, he took measures to relieve the poor of the kingdom. He abolished torture, which up to that time had been used in criminal trials, allowed freedom of the press, and decreed that all the people should be free to worship God in their own way.

His father had left him a magnificent army, in which there were some regiments of immensely tall men. Frederick at once disbanded these regiments, and the world took this as a sign that he

would reduce his army, and hoped that he would treat it as a highly polished weapon, to be kept for ornament, not use. Men said that he would settle down to the ordinary work of government, and the pleasure of his literary pursuits, but Frederick had other ideas. He thirsted for glory, which he had been taught to look for in war. Very quietly, he raised the army to 100,000 men, drilled and trained it as no army had ever been drilled and trained before, and waited for an opportunity to use it.



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This is part of the front of Sans Souci Palace at Potsdam, which was built by Frederick the Great, who also had part of the fine gardens, which surround the palace, laid out. Frederick called the palace Sans Souci, which means "without care." He lived there much of his time during the last years of his life. A number of his personal belongings are carefully preserved at Sans Souci. Near by is the large New Palace, which Frederick also built and which is used as a residence by the German emperor.

THE INVASION AND CONQUEST OF SILESIA

The opportunity that he looked for came, a few months after he began to reign, on the death of the Emperor Charles VI. Charles had no son, but, as we have read in the story of Austria-Hungary, his daughter, Maria Theresa, succeeded to his dominions. Now in these dominions was included the little country of Silesia, which slopes gently from the plains of Brandenburg to the crest of the Bohemian Mountains. Frederick wanted to add this rich province to his own possessions, and when he heard of the emperor's death, without losing an instant of time, he laid his plans to invade it. Within a few weeks he had his army ready on the border, and then, setting up an old claim to four small duchies in the south, he marched into the country.

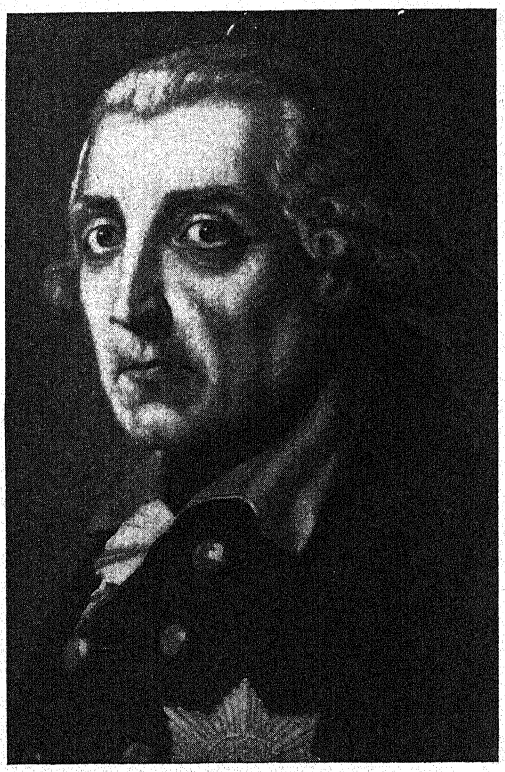
There were only a few thousand Austrian soldiers in Silesia, too few to stop Frederick's army, and in a few weeks the whole country, except a few fortified towns, was in his hands. The next year, the Austrians gathered an army together, and made Frederick fight to keep his conquest, but they could not drive him out.

When peace was made, he kept all of Silesia, except a small strip of mountain-

ous country, which Austria still holds, and he also got the little county of Glatz, which lies between Silesia and Bohemia.

While the war for the possession of Silesia was going on, the elector of Bavaria, who claimed the thrones of Austria, Hungary and Bohemia, began another war against Maria Theresa to take her dominions from her. This war, known as the War of the Austrian Succession, was of great assistance to Frederick and he used his influence to have the elector of Bavaria chosen emperor with the title of Charles VII.

As soon as the treaty was signed which gave him Silesia, he set to work to make the country into a Prussian province, and in this he was greatly helped by the fact that the people had been more or less oppressed by their Austrian rulers. Frederick had been careful to impose as little hardship as possible upon them during the war. They looked upon him as a champion, and the greater number of the population were glad to change their allegiance. His rule was stern, but it brought prosperity, and the people rejoiced in their new found peace.



After he began his wars, Frederick always wore his uniform, a blue coat with red collar and facings. After the fashion of his time, he wore a short, curled wig, tied back with ribbon. He always wore a cocked hat of felt.

WHY FREDERICK BEGAN THE SECOND SILESIAN WAR

Meantime the War of the Austrian Succession went on and for two years the armies of Maria Theresa were successful. But Frederick feared that if she were victorious, she would try to wrest Silesia from him. Therefore he went to the aid of the emperor, invaded Maria Theresa's kingdom of Bohemia with a large army, and the Second Silesian War began.

This war, like the first, lasted for two years. The king of Saxony joined Maria Theresa, and sometimes it seemed as though Frederick would lose the war. On the whole, however, he was successful. He found out the most secret plans of his enemies, and defeated them, and at the end of the second year, peace was made. The treaty was signed on Christmas Day, and when, a week later, Frederick went home to Berlin, the people greeted him with cries of "Frederick the Great." He was saddened, however, by the news that one of his old tutors was dying, and it showed well for him that he found time to go at once to see this true old friend.

After the Second Silesian War was over, Frederick had ten years of peace. Thanks to his father's training, he was a good man of business and during this time he built up the prosperity of his dominions. He encouraged agriculture, manufactures and commerce. Swamps were drained, and moorlands brought into cultivation. It is strange, however, that with all his love for learning, and his interest in the prosperity of the country, Frederick took no pains to see that the great mass of the people were educated.

WHY THE SEVEN YEARS WAR WAS FOUGHT

Meantime the Emperor Charles VII died. Maria Theresa's husband was made emperor in his place, and she made peace with Bavaria and France. But, although she had ceded Silesia to Frederick, she never stopped making plans to get it back, and before many years had passed, he began to suspect that she had

made a secret treaty with the Empress Elizabeth of Russia and the king of Saxony to make war against him. His suspicions soon deepened into certainty, and upon that he acted with his usual promptness and began what is known in history as the Seven Years' War.

It is impossible in a short space to tell of all that Frederick did in these seven years. Austria, Russia, France and, later, Sweden were opposed to him, and his only ally was England. England, who was engaged in America in what we know as the French and Indian War, could not give him men, but she did give him money, without which he could not have carried on the fight. Frederick won many victories, of which the most famous is Rossbach, where with 22,000 men, he defeated an army of 50,000. His personal bravery was very great, and he became the idol of his soldiers. But the odds against him were great. In one battle he fought so recklessly that an officer asked if he meant to take a battery single-handed. He met many defeats and once he became so despondent that he was tempted to take his own life. Once he was slightly wounded, and narrowly escaped being taken prisoner, and another time, his clothing was riddled with shot.

As the years went on it seemed as if the war must end in Frederick's complete overthrow. The climax of his woes was reached when his uncle George II of England died. George III, who cared nothing for Frederick, made peace with France, and Frederick was left without support. The same year, however, the empress of Russia died. Her successor, Peter III, was Frederick's greatest admirer. He at once made peace with Prussia. The Russian armies were ordered home, and Frederick was saved. His only opponent now was Austria, and though the war dragged on for another year, both countries were exhausted and a peace, which left him in possession of Silesia, was signed in 1763.

FREDERICK SHOWED HIS REAL GREATNESS IN TIME OF PEACE

It was now that Frederick showed his real greatness. Few men could have risen as he did to the task of bringing back prosperity to his ruined land. The country had been reduced to penury, but it was not in debt, for there was nowhere that Frederick could borrow. He had somehow got enough money to carry on the war for another year, and this he used to help the people. The army horses were used to cultivate the land, seed was bought and distributed, and by degrees houses were rebuilt, and commerce and industry built up again.

About ten years after the close of the war he shared in the first partition of Poland. This partition completed the ruin of Poland, but brought Polish Prussia, which had hitherto divided Brandenburg from East Prussia, under Frederick's rule and greatly strengthened his position in the empire. Some people have tried to lay the whole blame for the partition on the empress of Russia, or even on the Emperor Joseph, Maria Theresa's son. There is little doubt, however, that the chief fault was Frederick's. He wanted Polish Prussia. When he saw an opportunity to get it without the cost of a war, he took it, and there can be no justification for his act.

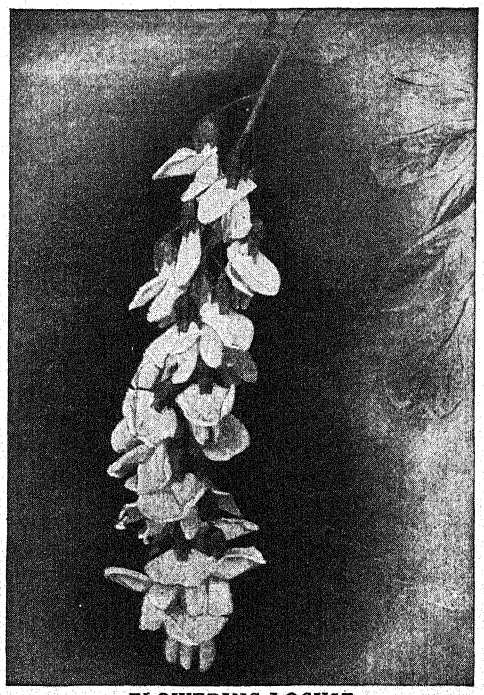
Much suffering has come from the partition of Poland, and the people have always been restless and discontented under the foreign rule to which they have been subjected. The Great War revived their hopes of reunion under one government, and it is yet possible that these hopes may be realized.

FREDERICK THE GREAT TRIED TO UNITE NORTH GERMANY

Some years later, when the elector of Bavaria died, another quarrel with Austria was threatened. But Frederick feared to bring on another dreadful war, and the matter was settled by treaty. Then Frederick began to think of making a union of the North German princes to curb the power of Austria. Before he died, he partly succeeded, and the League of Princes which he formed was the germ from which grew the idea of the present German Empire.

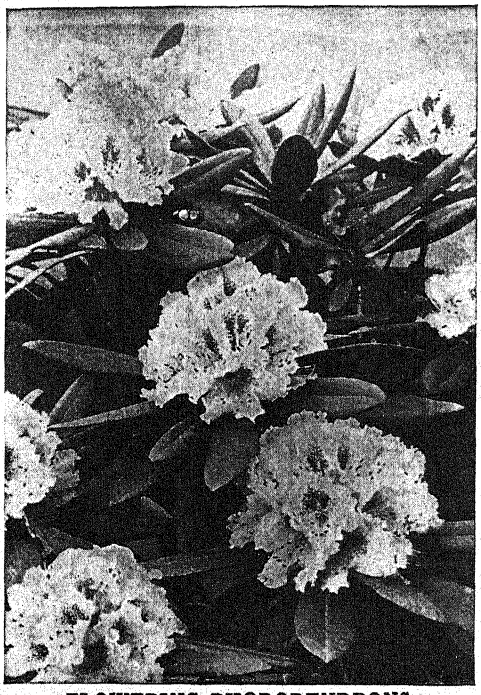
In his old age, his people called him "Father Fritz," a title that was very dear to his lonely heart. He suffered much from gout, but, nevertheless, he continued to work as hard as in his youth. In August, 1785, he held a review at which Lafayette was present. Rain fell heavily, and the king got a chill, which brought on an attack of gout. During the next year he gradually lost strength, and died on August 17, 1786, in the seventy-fifth year of his age.

THE NEXT STORY OF MEN AND WOMEN IS ON PAGE 4625.



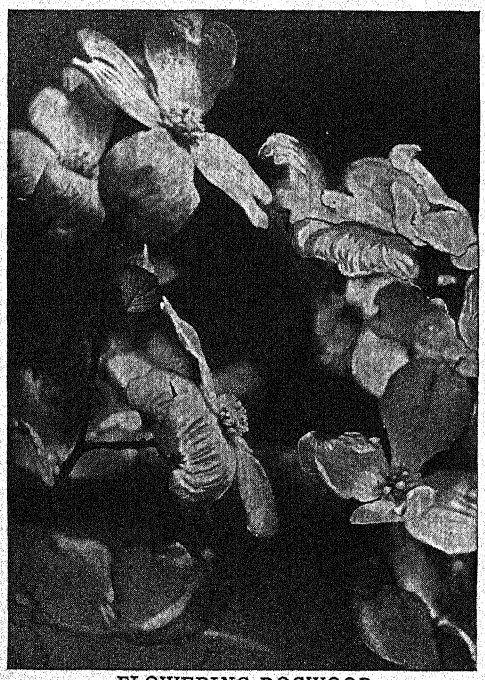
FLOWERING LOCUST

The common locust has such handsome foliage, and such quantities of fragrant white blossoms, that it was planted extensively in European parks.



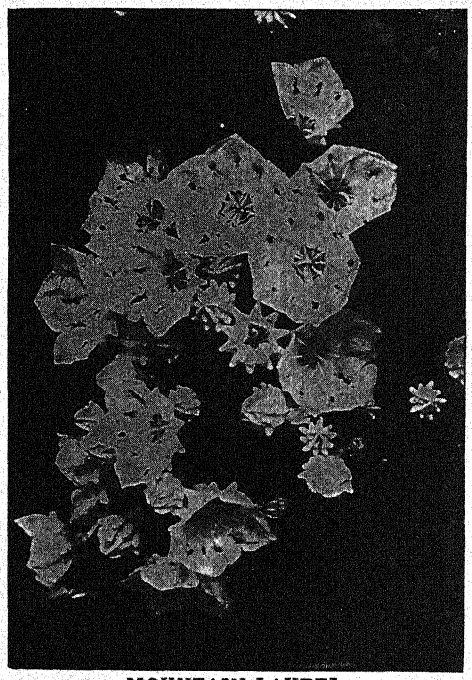
FLOWERING RHODODENDRONS

Rhododendrons, both native and foreign, are frequently planted in cool and shady places, for their evergreen foliage, and splendid heads of flowers.



FLOWERING DOGWOOD

Dogwood trees grown in an open field look like small apple trees. The foliage takes on brilliant scarlet lines in fall, and the close clusters of berries are even redder. The white flowers make a fine showing.



MOUNTAIN LAUREL

Mountain laurel is one of the handsomest of American evergreen shrubs, and is often transplanted to parks and gardens. Its flowers, which shade from white to a beautiful pink, bloom in June.



SOME STRIKING AMERICAN SHRUBS

CONTINUED FROM 4480

ONE usually thinks of a shrub as quite tall, rather like a small tree, or at least like a bush, yet some shrubs creep along the ground and others climb high into the trees. To put it as plainly as possible, a shrub is a woody plant that does not die down to the ground each winter, but keeps its side-shoots from year to year, breaking into bloom each season from buds on these shoots.

Trees soon lose their side-branches, at the base of the trunk, as they grow taller, and shoot up into tall shafts, crowned by most of the branches, growing in a head. Upright shrubs, on the contrary, retain their lower branches more frequently and become " bushy " in appearance.

THE TRAILING ARBUTUS, SOMETIMES CALLED MAYFLOWERS

Among the shrubs that creep, is one that grows in many parts of eastern North America but is particularly dear to the people of Massachusetts. It is the trailing arbutus. It grows during the summer, shooting out long branches that trail along the ground, taking root here and there. Its leaves are oval, or almost round in outline, leathery, rigid and evergreen. By autumn, the clustered buds at the end of the hairy twigs are almost ready to open. But they do not do so. Cold weather sets in, dead leaves drift over the plants, and, singularly protected by them, the arbutus waits until the spring sun warms it; then the flowers have but little growing to do, and soon open, among the first flowers of the season. Without doubt they were the first pretty flowers the Pilgrims found. Mayflowers they are called sometimes, and, very frequently, May-pinks.

The flowers themselves are salver-shaped, waxen, and pink or white. They have a delicious " woodsy " fragrance that reminds one of sweet birch and wintergreen, the spicy little evergreen shrub, that is so close a relative of the arbutus, for, with the laurel, the azalea and the bearberry, they both belong to a large family—that of the heaths—which contains a great many odorous, white or rosy-flowered shrubs.

PINK AND WHITE AZALEA OR PINXTER-FLOWER

The lovely pink azalea, or pinxter-flower, as it is quaintly known from its

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habit of blooming about Whitsuntide, or Pinxter, in early spring, is also called wild honeysuckle, and not without some reason, for its lovely coronets of delicately cut, long-tubed flowers, poised on slender, brittle stems, do suggest honeysuckles, except for their color. The resemblance is aided by the quintette of very long stamens and two pistils, which are thrust out far beyond the petals. This character would lead one to suppose that wind carried the pollen from flower to flower. But the pollen grains are so coated with a viscid substance that strings of them may be drawn from the anther-cells by the slightest touch of the finger. This leads one to believe that insects are the messengers desired. The rich fragrance of the pinxter-flower would also seem to be an attraction for insects. There is a white azalea, that blooms in midsummer, in swamps, that is still more fragrant.

THE EXQUISITE FLOWERS OF THE MOUNTAIN LAUREL

The mountain laurel, or kalmia, however, although very closely related to the azalea, is scentless. But so brilliant is the display of bloom on this evergreen shrub, which sometimes grows ten feet or more high, that no odor seems necessary even at night. It bears great flat-topped masses of flowers, ranging in hue from white to deep pink, set off, like an old-fashioned bouquet, by a salver of stiff, shining lance-shaped leaves, very dark green in color. Each flower is worth studying. It is like a saucer, which has a five-sided, rather than circular, rim. At each angle, and in each space between the angles, is a small pocket, which projects on the outside like a little knob. Look at a newly opened flower. You will see that each one of the ten pockets has the tip of one of the ten stamens safely stowed away within it. Its filament springs in an arch from the centre of the blossom. Run your pencil over the tops of the arches. You will probably jump with surprise, for every one of those stamens has jerked its tip out of its pocket, and is standing stiffly erect. Now if your pencil had been a blustering bumble-bee, he would have been well thumped by the upspringing stamens, and well dusted by the pollen jerked out of the open mouths of the pair of quaint jugs that form the anthers. He would have flown away, disgusted, and lit on another flower, whose trap had been previously sprung, perhaps, and would have rubbed off some powder on to the ready stigma. Thus he would have done what was expected of him, and the laurel seeds in the second flower would have been benefited in a way that it would take too long to explain, but which results in the contents of the pollen-grains getting down to the very young seeds through the pistil.

Masses of laurel leaves, as they endure transportation well, are stripped from the bushes and used for holiday decoration. One should be careful about throwing them, when discarded, within reach of young browsing animals, for this foliage contains a poison more deadly than strychnine, and many animals have been killed by eating it. Sometimes children are poisoned by eating the young seedling plants instead of wintergreen, which they much resemble, although they lack the spicy taste. Honey made from laurel bloom is also said to poison those who eat it. The narrow-leafed laurel, which is much smaller, with darker, smaller flowers, is known as lambkill, sheep-poison, etc., showing that its dangerous qualities are suspected.

THE PLANT ON WHICH THE LUSCIOUS BLUEBERRY GROWS

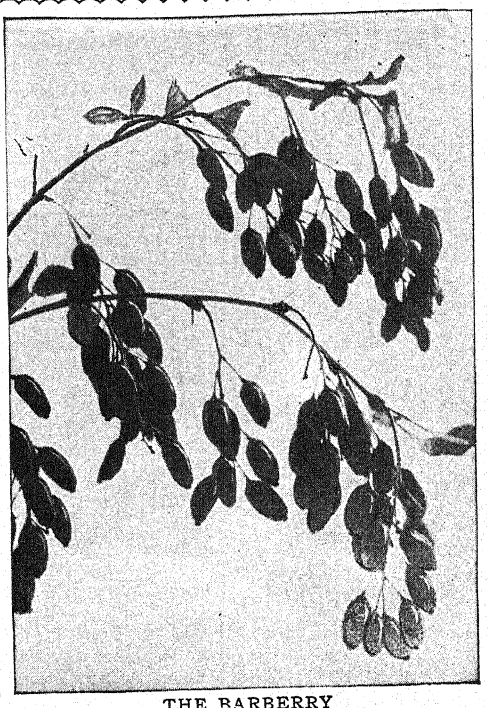
There is a group of relations of these gorgeous shrubs that are very plain in appearance, crowded with little drooping white or rose-flushed, bell-shaped flowers, that, in one case, at least, fairly tinkle when the bush is gently shaken. Whortleberries, some of them are called in Europe, or bilberries, but in America we lump several kinds under the name blueberry or huckleberry, having a vague intention of calling by the first name those that are blue, with a waxen bloom like a grape, and the shining black fruit by the other. Where these berries grow at all, they usually grow in great patches, and many women and children in the country earn many dollars each year by picking and selling the little berries, that are so crowded on the branches that they may be plucked in handfuls.

The Indians (as well as the bears) knew how good they were, and put them into their porridge, or into the corn-cakes they cooked by the camp-fire. But huckleberries now are almost as seldom cultivated as they were when Indians roamed over the rocky hillsides and



THE STRIPED MAPLE

The striped maple, or moosewood, is one of the most charming of our smaller trees, both in flower and fruit. Its buds afford a food for large deer.



THE BARBERRY

The common barberry bushes are not native, having been brought here from Europe, but there is a different native American species in the Alleghanies.



THE AZALEA

Azalea flowers of different varieties resemble one another very much. The pinxter-flower blooms before the leaves are fully expanded, but the white azalea is set off by fully grown leaves.



THE HUCKLEBERRY

The common blueberries, or huckleberries, grow thickly on low, stiff, branching bushes, the berries appearing soon after the flowers. The leaves, in autumn, take on very pretty lines of scarlet.

sandy patches where they grew. In certain districts, however, large tracts are taken care of, and burned over very early in spring every two or three years. This kills small trees and weeds among the low blueberry bushes, which grow very quickly, and bear their best crop the year after they are burned over.

SEEDS OF THE RED CHERRY CONTAIN POISON

The Indians probably could not get much comfort out of the wild red cherries, for the flesh is very thin and very sour, but birds gorge themselves upon the plentiful, scarlet fruit, and at least one little animal, the gray chipmunk, nibbles away at them wherever it can reach the clusters of fruit. When in flower, this slender little tree of our rocky woods is wreathed in a veil of tiny, star-like, snow-white blossoms. It would be well to regard this cherry with some suspicion, for the leaves of the more common black cherry, with racemes of fragrant flowers and of shining black fruit, are very dangerous to cattle (when partly wilted, especially), and it is probable that the other species would be equally so. And children should not swallow cherry seeds of any kind, for concealed in them is a wonderfully active and prompt poison, *prussic acid*, which may be set free in the stomach. It gives the pits the taste and odor of bitter almonds.

Blooming under the wild red cherry, are the straggling bushes of the choke-cherry, from which hang long clusters of luscious looking scarlet berries, which will pucker the mouth and throat most amazingly.

THE STRIPED MAPLE, OR MOOSE-WOOD—A MINIATURE TREE

We are all familiar with the great maples, so often planted as shade-trees, such as the scarlet, the sugar and the Norwegian kinds; but there is a delicate little maple that we rarely see, unless we travel on the mountains or in the northern forests. It is uncommon, even then, outside of the woods themselves. It seems to be happy only in thickets of low trees covering rocky hillsides. In the north woods the hunters know it as moosewood, for those great deer, the moose, feed upon its large red-scaled buds. The other name of striped maple is quite apt, for its smooth dark-green bark is lined up and down with delicate tracings of a white pigment that can be scraped off with the nail. It is a tree that Japanese artists would like to draw, for its great, soft, triple-pointed leaves are arranged in a fine spray, and from the twigs swing delicate pendent clusters of pale yellow bells, like fragments of necklaces; and, late in summer, follow strings of pale-brown winged fruits that turn to gold when the rays of the setting sun strike through them.

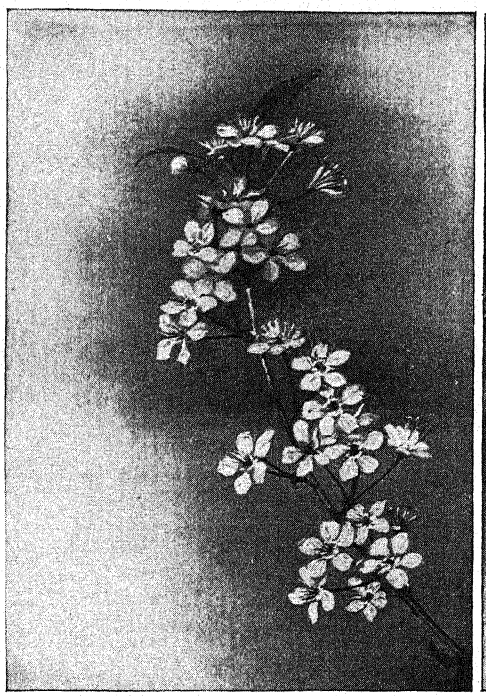
FLOWERING DOGWOOD FILLS THE WOODS WITH BLOOM IN MAY

In the same woods as well as those farther south, and very widely distributed, are the dogwood trees, the name being borrowed from a small European tree, closely related to it, from whose bark a healing wash for dogs used to be extracted. In May they become snowy banks of bloom, but each apparent blossom is masquerading in a white domino. In the centre of the large white petals—as those who are not botanists very naturally call them—which form the domino, are grouped the maskers or real flowers, each quite complete in itself,—a pale, somewhat slender floweret, four-parted at the margin. The snowy, striking, heart-shaped leaves we have called petals, are really "bracts" (a form of leaf that enfolds, or closely attends a flower) which cover the flowers in the little square buds. At that time they are quite green, but gradually become white as they unfold and expand. They serve to attract insects by making the tiny flowers very conspicuous, and also provide a platform upon which flying creatures may alight, so that they may search easily for, and suck up, the nectar from the very bottom of the yellow flower-vases.

If we wish to see how the dogwood flowers would look without their brilliant bracts, we may search in thickets or in woods for other varieties, mostly low shrubs. Some of them are quite common along roadsides, while others, and especially the round-leaved dogwood, prefer shady and rocky woodlands. The latter has a flat-topped cluster of starry flowers, a little larger than those of the flowering dogwood, and quite white, but it has no brilliant bracts.

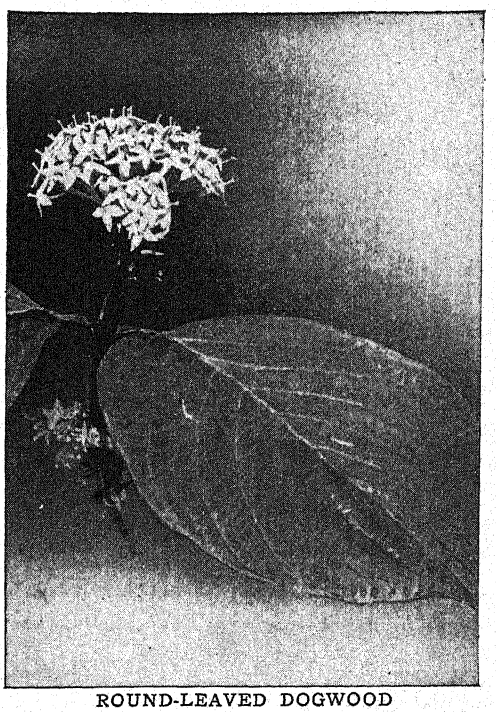
THE BARBERRY

Along roadsides we may find the barberry, a tall bush, very straggling in



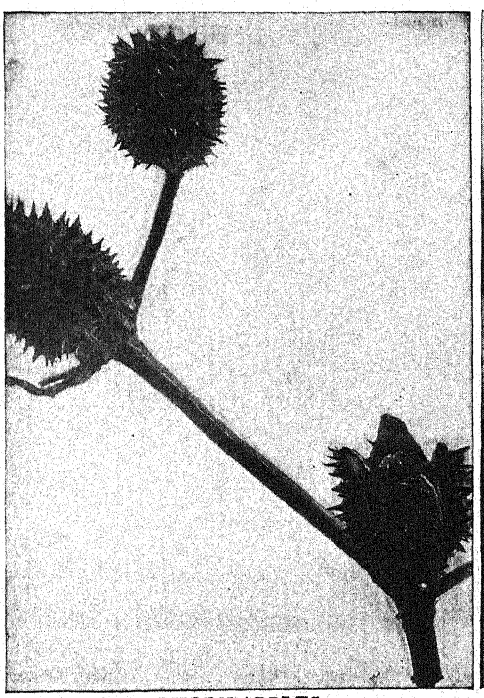
WILD CHERRY

Birds are exceedingly fond of the small tart drupes of this tree, which is common in rocky woods. Its delicate white flowers are borne in great profusion.



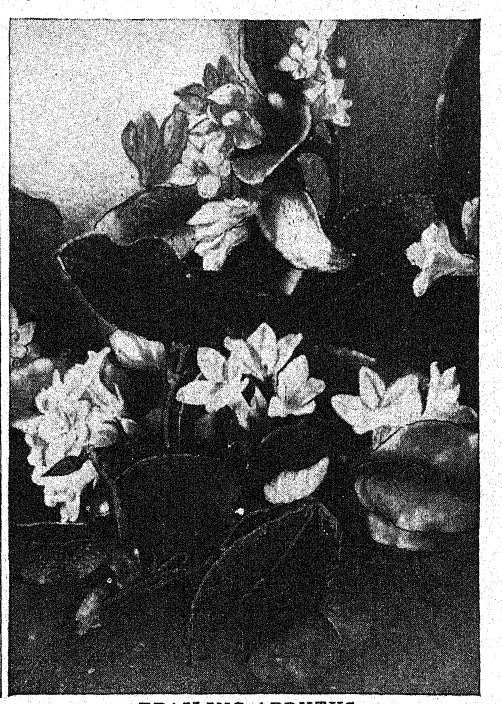
ROUND-LEAVED DOGWOOD

This shrub grows in rocky, shaded woods, where its small, white flowers in clusters are effectively set off by the pale round leaves. The fruits are light blue.



THORN-APPLES

The thorn-apples are not properly shrubs, since the rank branches are killed each winter. The small seeds that slip out of the ripe fruit are poisonous.



TRAILING ARBUTUS

This evergreen shrub is often called Mayflower or May-pink. It is also known as gravel-plant on account of certain curative powers it possesses.

its growth and crowded by a host of suckers. It has come from the Old World, but has become so much at home here that we forget that fact. It throws out long, slender and brittle branches, studded with tufts of small, obovate or spatulate leaves; but as soon as we pick a spray we discover that it is very fully armed with sharp spines that point in every direction, and are leaves that have been transformed entirely into spines like those of the cactuses. In fall the ordinary foliage falls off, but the spiny leaves remain, ready to keep browsing animals away from the tender, growing twigs.

Racemes of pretty yellow flowers droop from the tiny barberry shoots in spring, in which the nectar is produced in saffron-colored swellings, on the petals, and also on the filaments of the interior circle of stamens; for the six pollen-bearers stand in two whorls, slanting outwards and lying in the concave faces of the similarly placed petals. The bases of these stamens are very sensitive, and when a bee flies upward to the drooping flower—that, like a roof, protects its stamens from rain—and plunges her feet or proboscis therein, seeking honey, she sets off a trap, as it were. The stamens fly upwards at the slightest touch, toward the stigma, and tap the bee smartly on the head, snapping open the little trap-doors at the top of the anther, and powdering the visitor thoroughly with pollen. The later racemes of oval scarlet berries droop from the bending branches during almost the whole winter. They are very acid,—too tart to interest many birds. But they make delicious preserves, with a very distinct flavor.

THE BEAUTIFUL FLOWERS AND FEATHERY LEAVES OF THE LOCUST-TREE

The tulip-tree grows best in damp soil but the locust-tree thrives best in dry and sandy land. It has a somewhat tropical look, reminding one of the African mimosas, for its leaves are divided into many rounded leaflets. Its spray, seen against the sunset light, looks like delicate sea-weed, and the tree itself, when uninjured, suggests instantly the gray-tinted ones seen in the landscapes of the older French painters, or of Corot; or, to use a more commonplace comparison, like quaint old pencil-drawings. However, the flowering locust is rarely seen in fine condition, for its branches are extremely brittle, are usually injured by borers, and some are apt to crash down in every storm. In June it is a glory of bloom. Great clusters of racemes of pea-like flowers droop from every branch, white, with golden hearts, an American rival of the Japanese wistaria with the added virtue of very great fragrance.

But one must approach the tree with caution, for it is defended by vicious thorns, while stray thorns are scattered here and there on the main trunk, even near the ground, where we do not expect them. Brittle as the branches are, the wood, when properly seasoned, withstands decay admirably, especially when in contact with the soil, and is greatly sought for fence-posts.

Even more tropical in appearance than the locust is the stag-horn sumac with its crooked branches covered with thick, soft hair, not unlike the velvet of a young deer's horn. Its closely set, pyramidal masses of acid fruits are also wrapped in crimson plush, as well they may be, for they crown the awkward brittle stems until spring, or as long as the birds will let them stay. Although sour and dry and velvety and difficult to swallow, they offer a sort of hard, unnourishing food to many a bird hard pressed by hunger in the winter season. Chickadees fairly haunt them, and cheerily peck the pyramids to pieces.

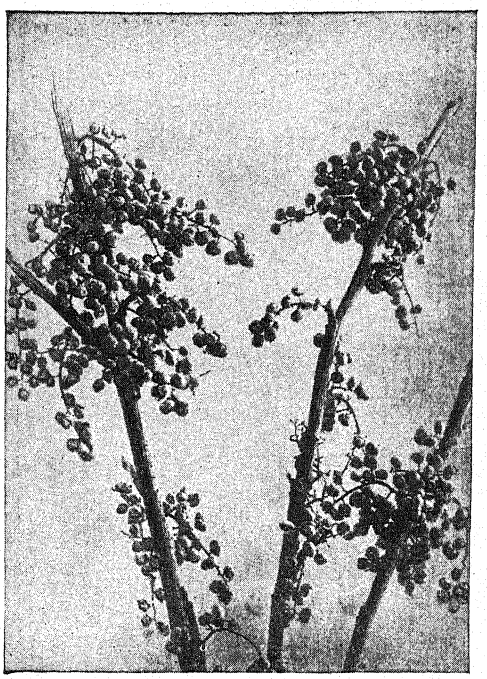
POISON-SUMAC IS DANGEROUS TO TOUCH

While we are prowling about the margins of swamps looking for the pin-oak, we must take care not to run into, or handle, the *poison-sumac* or swamp elder as it is sometimes called. It is most dangerous in early summer, for then the flowers are opening, and even the flying pollen seems to be quite able to cause that itching inflammation of the skin which tortures some people so greatly, whether caused by the poison-ivy of the fence-posts, or by its relative the poison-sumac of the swamps. This is a shapely shrub or small tree, which often grows among alders and elders. Its rather long and bare, slender limbs bear at the top a great cluster of leaves composed of from seven to thirteen pointed leaflets. These *stand up* from the mid-rib in a way that is quite unlike the attitude of the leaflets in other trees. They are very glossy, of an odd shade of dark green above, and have red stems, while the mid-rib from which they spring



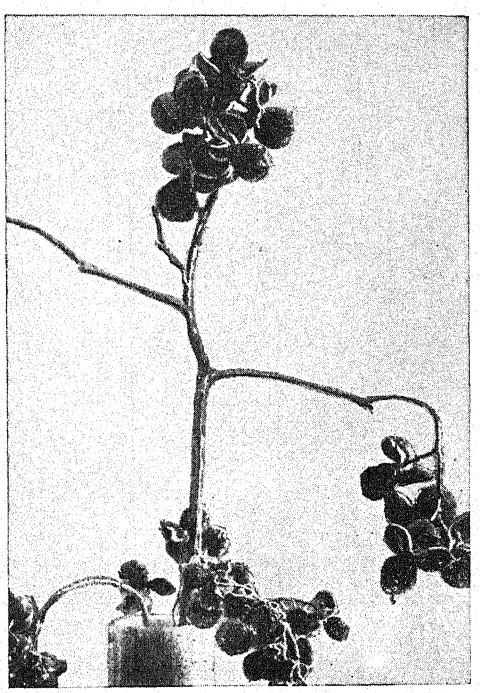
POISON-SUMAC

A shrub or small tree which grows in swamps, that is to be avoided. It is poisonous to the touch. It has upstanding leaflets on red stems, and white berries. The foliage turns a beautiful red in autumn.



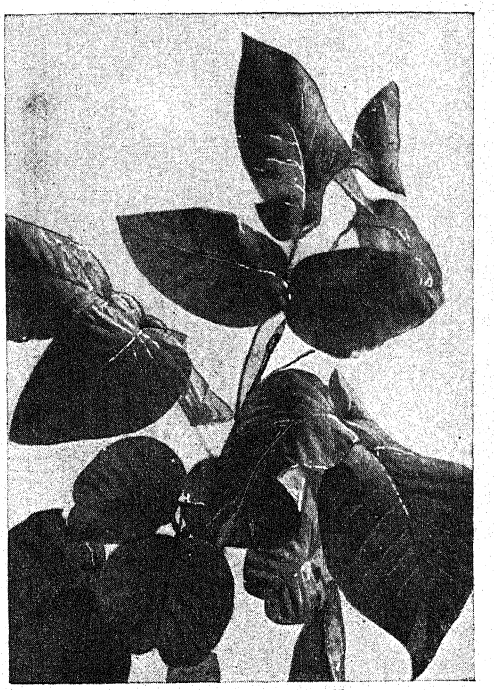
POISON-IVY BERRIES

This shrub may be easily recognized in winter by its grape-like dry clusters of white berries, and in summer by the entire-edged up-standing leaves on red stems. The fruit of the common sumac is dark red.



THE BITTERSWEET

There are two vines called bittersweet. This one, with scarlet and orange berries, is quite harmless, although the other is considered poisonous.



POISON-IVY SPRAY

It should be remembered that the poison-ivy may affect the skin even in winter, when the leaves have fallen, if the fruit or twigs be handled or bruised.

is also red. This is a point to be remembered! The little green flowers fall loosely in long spray-like panicles from the axils of these leaves. In the fall, the leaves very early change to unusually brilliant shades of orange and vermilion, and when they have fallen to the mud, grape-like clusters of white berries still grace the tops of the branches, tempting birds to eat them, and occasionally, I fear, tempting young folks with an eye for winter decoration, to pick them—with sad results—for root and branch, winter and summer, the poison-sumac is poisonous to the touch. Practically the same thing can be said of its more common cousin, the poison-ivy, which crowns fence-posts and old stumps and rears its slender branches among the thickets. This, however, has only thin leaflets, without the warning red stalks, but has the same gloss on its dark green leaves, and assumes the same brilliant autumnal coloring.

W. H. Gibson has given us a catchy little jingle about the sumacs which may help us to remember the important differences between the poisonous and harmless sumacs.

"Berries red,
Have no dread!
Berries white,
Poisonous sight!
Leaves three,
Quickly flee."

One should be cautious, moreover, in going to the leeward of a fire in which the poison-shrubs are burning, and should never chew bits of wood without first examining them; the smoke from the burning, or the chewed-up splinter of bark may result seriously even for persons who are not usually affected.

POISON-IVY SHOULD BE SHUNNED

Although not quite so virulent as the swamp or poison-sumac, the poison-ivy, its close relative, is quite as dangerous. It is much more common, springing up in many an old field and woodland clearing, and climbing upon roadside fences, where it thrusts out its short branches into the faces of the passers-by. It climbs by means of rootlets protruding from the bark, and each leaf is made up of three leaflets of an irregular lobed, ovate outline. The number of leaflets is to be remembered, for the poison-ivy is continually entangled with the innocent five-leaved Virginia creeper or ampelopsis. The spreading of the poison-ivy is largely due to the birds, who devour the berries eagerly, pallid, hard-shelled and unappetizing as they look to us. Some of the seeds passing through the bodies of the birds fall uninjured and proceed to sprout.

THE BRILLIANT BERRIES OF THE BITTERSWEET

A much more gaudy climbing shrub is the bittersweet, that sometimes shares the fence-posts with the poison-ivy. During the summer one hardly notices the pale vine, as it climbs by twisting its supple branches around trees and other supports. One will sometimes find small trees in a grove, with a swollen portion around which a welt or groove winds spirally. This is a sign that some vine, and usually a bittersweet, has enwrapped the growing sapling so firmly that it has nearly strangled it, and forced it to grow in an unusual manner where the vine pinches, just as one's finger swells about a tightly tied string. Shade, or the upgrowing of the tree, generally kills the vine, and leaves the sapling free, but sometimes fragments of bittersweet are embedded in the bark. In fall, the orange colored berries of the bittersweet split into four portions, that bend backwards and leave exposed a fleshy scarlet sphere, called an aril, that covers the seeds. Scarlet and yellow placed together make each hue more brilliant, painters say, and doubtless these gaudy berries catch the eye of the birds, and are carried afield by their means, as are those of the poison-ivy.

THE DANGEROUS THORN-APPLE, SOMETIMES CALLED JIMSON-WEED

Near the end of this very short list of shrubs I put the thorn-apple, for it really is not a shrub at all, since each year the stalks are laid low by frost. However, it looks so much like a great widely branching true shrub, and it is so dangerous, that I shall speak of it here. Its unshapely, lobed, dark green leaves, rank in odor and arranged in clusters separated by long spaces of bare stem; the toughness of its branches; and above all its morning-glory-like flowers, that bloom at night, and round spiked fruit, make it easily recognized. An interloper from the tropics, it thrives very well on our dust-heaps and road-

sides and grows rankly, forming thickets on the vacant lots of cities.

There are two common sorts, one bearing exquisitely white flowers; the other, blossoms with violet corollas, and having purple stems and shades in its foliage.

The thorn-apples or daturas are sometimes called Jimson-weed, a shortened form of Jamestown weed. They are so called because certain soldiers, eating its young sprouts near Jamestown, Va., in colonial times, soon became delirious and acted as if half mad. This was because, while not poisonous to the touch, the thorn-apples are narcotically poisonous when eaten. Large amounts throw the victim into a fatal stupor, but in slighter quantities induce delirium. Luckily, the fruit is not very tempting. The green, fleshy, ball-like capsules soon become dry and brown, and are thickly beset by long but not very sharp prickles. It soon splits open downwards from the top, usually into four pieces, and the thin little black seeds can be plainly seen. These are the most dangerous parts of the plant, and children should be warned not to nibble them.

It is these shrubs, growing low and in dense clusters, that form the thickets that make an attractive and sheltering border along the outskirts of the woods. They flourish in a continous fringe by the banks of country streams, arching over the currents and reaching out on the sunny side into rounded masses of foliage. Standing upon a hill-top one can trace the winding course of streams, whose water cannot be seen at all, by the green cushiony line of bushes that marks their course. Such thickets are the favorite resort of small birds, which find among their recesses plenty of the insects or of the small fruits upon which they feed, while they feel safe among the close twigs where they cannot easily be seen by hawks or other enemies, of which birds live in constant fear when they are out in the open. Few small birds spend much of their time in the tall trees, and so they seek the thickets of shrubs.

Here, too, insects, snails and such small creatures live in the shaded soil and decaying leaves. These attract the toads, wood-frogs and turtles; and after them go snakes and various of the smaller mammals, wandering rabbits, woodchucks, raccoons, foxes and so on.

HANDSOME RHODODENDRONS AND OTHER EVERGREEN SHRUBS

Although the Himalayas appear to be the haunt of most species of rhododendrons, America possesses several of these lovely flowering shrubs. The most beautiful ones live chiefly on mountains, occasionally creeping down their flanks, however, into cool shadowy glens of the lowlands. They arrive at their greatest size, that of small trees, in the southeastern mountains, where they are called "laurel," or rose-bay, bearing great clusters of pink, or white, spotted flowers, jutting out from massy foliage of dark, shining evergreen leaves.

Another evergreen shrub of the South, is the climbing "smilax," closely resembling its allies, the "catbriers" of the North, whose twining stems, set with stiff leaves, are frequently sent North for Christmas decoration, along with the prickly foliage and scarlet berries of holly.

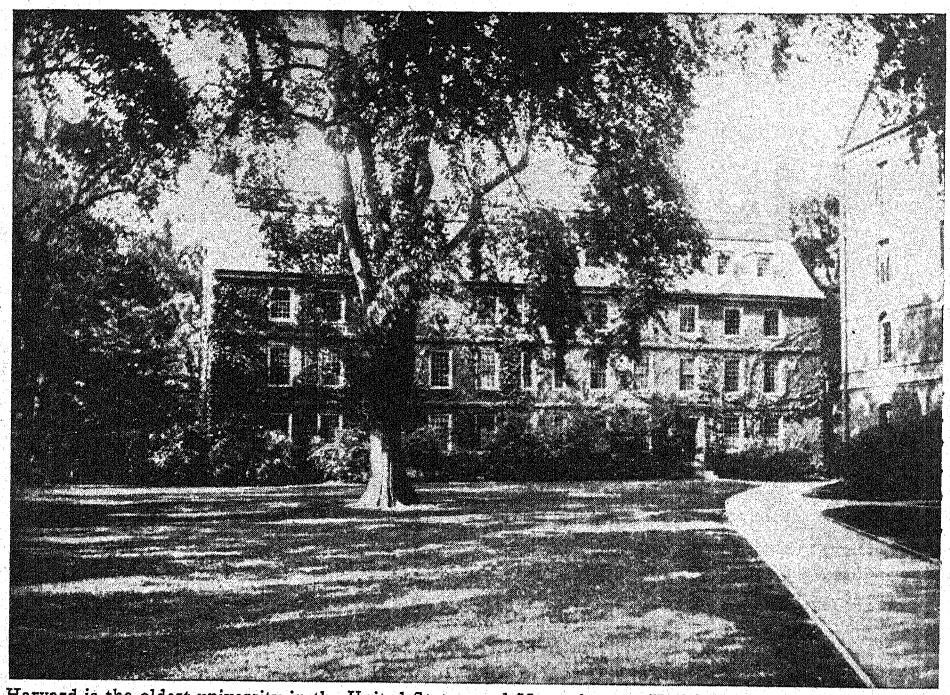
The black alder, of swamps, which loses its foliage, but is strikingly adorned with close-crowded vermilion berries, is also a holly, like the gay winterberry, the ink-berry and the inconspicuous cassine or yaupon, whose leaves are dried for rustic tea-drinking, and were formerly used by Indians for brewing the sickening "black-drink" with which they ceremonially dosed and purified themselves. The leaves of the New Jersey tea, a widely branching little shrub, every twig tipped with bunches of tiny white flowers, were said to have served in an infusion, for a beverage; but the use of Labrador tea, woolly and astringent, appears to be more frequent in those sub-Arctic regions where it grows.

The Southwest has a shrub, the mahonia, "which looks like a holly, fruits like a grape, and is a barberry." It is frequently seen in modern shrubberies, but although evergreen in its own home, will lose its foliage in the North if not protected, thus unduly exposing its blue fruit. In the warmer parts of California, are found also the manzanitas, very conspicuous among other shrubs of the chaparral, on account of their smooth red branches, pale foliage, and large dark-red berries.

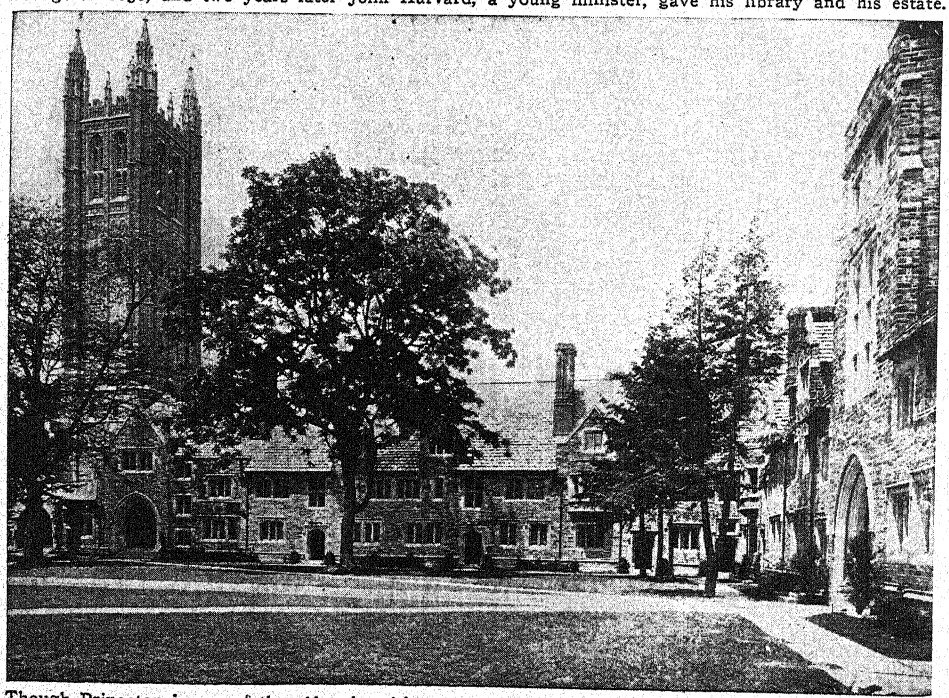
The witch-hazel, that sprawls in young forests, has flowers like rosettes of tiny golden ribbons. Its big ugly leaves are distilled and used for the familiar lotion.

THE NEXT NATURE STORY IS ON PAGE 4653.

TWO OF THE OLDEST UNIVERSITIES

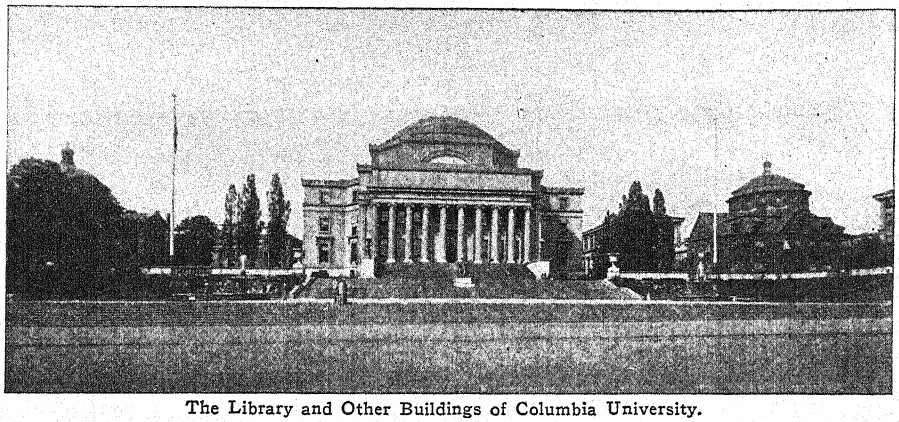


Harvard is the oldest university in the United States, and Massachusetts Hall is the oldest building of the University. Harvard has many buildings, very much larger and more costly than this simple structure, which was built in 1720. The General Court of the colony of Massachusetts Bay voted to establish a college in 1636, and two years later John Harvard, a young minister, gave his library and his estate.



Though Princeton is one of the old universities, this is one of the newer buildings. It is called Holder Hall, and is used as a dormitory. The institution was founded at Elizabeth in 1746, but was moved to Princeton in 1752. The official name was the College of New Jersey until 1896. The situation of the institution is very attractive.

Pictures from Press Illustrating Service, Inc.



The Library and Other Buildings of Columbia University.

AMERICAN COLLEGES AND UNIVERSITIES

CONTINUED FROM 4471

IN the United States there are many schools for higher education which we call colleges or universities. Some lists have nearly a thousand—more than in any other country in the world. In Europe the words are used very carefully, and the schools themselves are under strict laws. In the United States the national government does not control education, which is left to the states.

Some of the states have strict laws, and some have almost none. Some will not allow a school to call itself a college unless it has proper buildings and money enough to pay a certain number of professors. Others allow any school to call itself a college or university. The result is that some of the colleges and universities are as good as those to be found anywhere in the world, while others are little more than academies or high schools.

THE DIFFERENCE BETWEEN A COLLEGE AND A UNIVERSITY

It is hard to say what is the difference between a college and a university in the United States, as the words are used very carelessly. This understanding is growing, however. A college is a school which takes boys or girls, or both, after they have finished an academy or high school. They attend at least three years, generally four, and, if they have passed all their examinations, they get a degree such as Bachelor of Arts or Bachelor of Science. This gives them the right to place A. B. or B. S. after their names, and means that they have taken the first step in learning. Such a college may be a part of a university, or may be independent.

A university is a collection of several schools or colleges. Besides the college for general education, there are usually special schools for such subjects as law, medicine, dentistry, engineering, mining, agriculture, education, journalism, and the like. Not every university will have all of these, but it should have some of them. Besides it should have a school to train graduates of the colleges still further. When you see such letters as Ph. D., or D. Sc., after the name of a man or woman, it means that he or she has gone through a college and has then spent several years in studying a very few subjects, giving most of the time to one. This is what is meant by having a doctor's degree in mathematics, for example. The person who has this, spent most of his time study-

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ing mathematics, but probably studied physics also, and perhaps another subject or two.

How some of the great universities began

Some of the great universities in the United States began as simple colleges and grew into universities, as they increased in attendance and wealth. This is true of Harvard, Yale, Princeton, Columbia and others. The men in charge of some colleges have not wished them to grow into universities, but have preferred to have them do college work well. These colleges give only a bachelor's degree, but the work done in such institutions as Williams, Amherst, and others, is quite as good as that done in any college which is a part of a great university. Counting together the colleges belonging to universities and the independent colleges, there are about one hundred and fifty of high rank in the United States. The others have not a high standard, or do not do such thorough work.

Some of the universities, which have been established later, had several schools when they opened. This is especially true of the institutions in the West, which were founded by the state, and of some of the new universities to which wealthy men have made great gifts. As we said before, there are others which have no right to the name university at all. Wealthy men have also made large gifts to colleges and universities already established. Many of the institutions established as church colleges are now independent, but some churches still support and control many colleges.

Harvard, the first college established in the colonies

The first college founded in what is now the United States was Harvard, which was begun in 1636, only a few years after the first settlers came to Massachusetts. It was named for a young minister, John Harvard, who left the college his library, and £400, when he died. It was little more than an academy at first, and boys were publicly whipped if they broke the rules. Now it has thousands of students, scores of buildings and hundreds of teachers.

The next college opened in the colonies was William and Mary College at Williamsburg, Virginia, founded in 1693. It was prosperous down to the Revolution, but has never grown as some other colleges have done. Many distinguished men studied here. We can mention Presidents Jefferson, Monroe, and Tyler, Chief Justice Marshall, and General Winfield Scott.

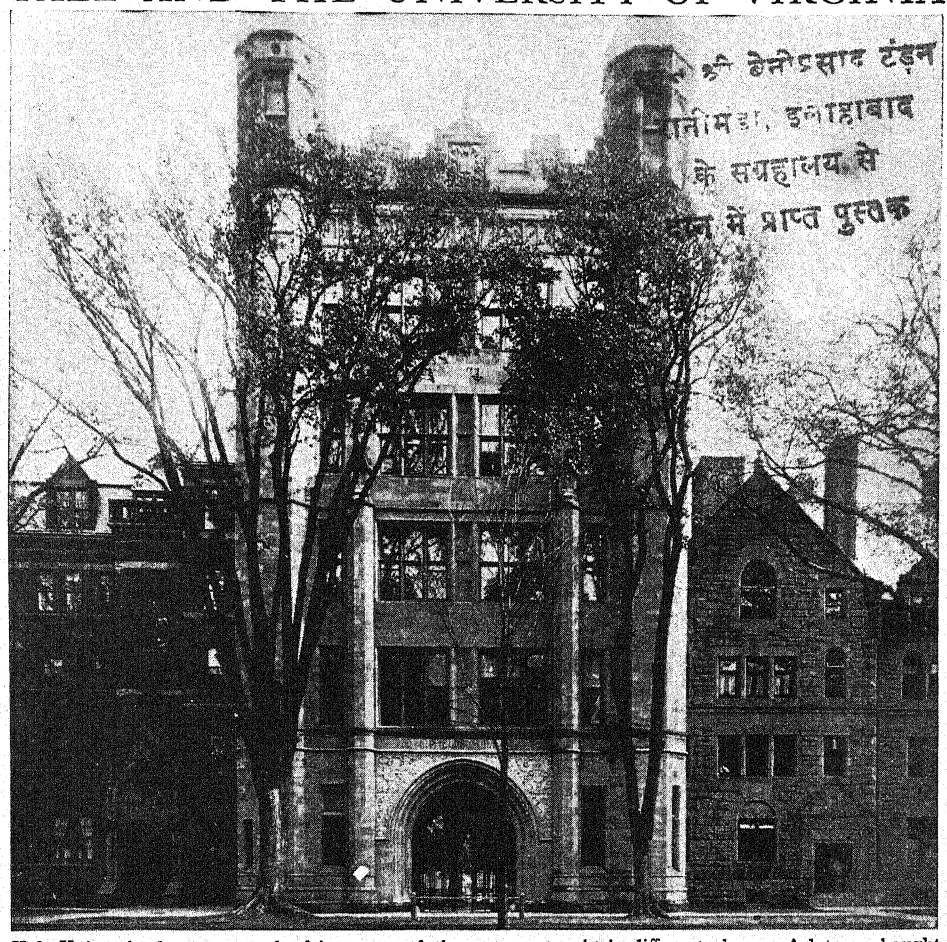
Yale began as a school for the training of ministers, in 1701, and was located wherever the president lived at first. In 1716 it was decided to move the school to New Haven, and from small beginnings it has become famous. It was named for a Welshman, Elihu Yale, who made the first important gift to the school. Princeton was founded at Elizabeth (then called Elizabethtown), New Jersey, in 1746, but was soon removed to Newark. In 1756 the college was removed to Princeton, where it has remained ever since. Though called Princeton, soon after it was moved to that town, the real name was the College of New Jersey at Princeton, until 1896, when it became Princeton University. President Wilson was student, professor and president at Princeton.

Nine colleges were founded before the Revolution

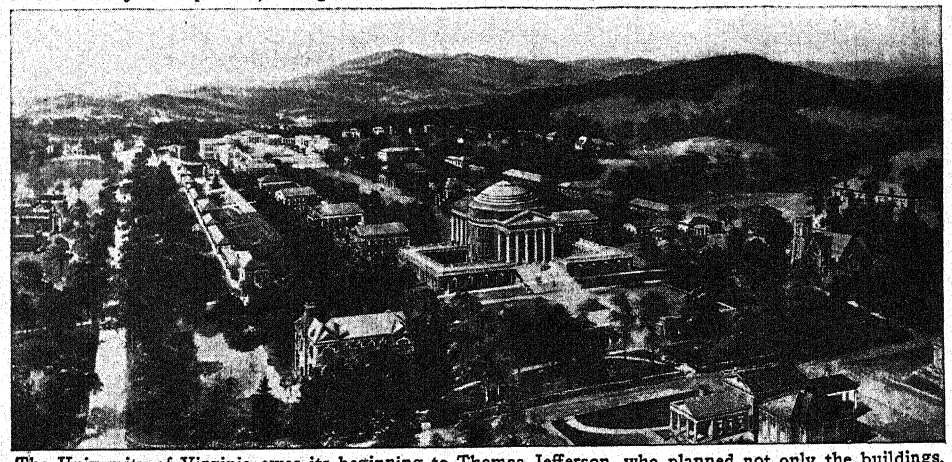
Nine colleges, which still exist in what is now the United States, were founded before the Revolution, and before 1800 there were twenty-one. Some of these were King's College (now Columbia) at New York in 1754, Queen's (now Rutgers) at New Brunswick, New Jersey, in 1766, Rhode Island College (now Brown University) at Providence in 1764. Dartmouth began as a school for Indians, in Connecticut, but was moved to Hanover, New Hampshire, in 1769. Though called a college, this school now has some of the departments of a university. Bowdoin and Williams were also founded before 1800.

Nearly all of these colleges were founded by different churches, but now we come to those of a different kind. What we now call the University of Pennsylvania was founded as a charity school in 1740, and through the help of Benjamin Franklin was much improved. It was soon called the College and Academy of Philadelphia, and in 1791 received its present name. The University of North Carolina at Chapel Hill was given a charter in 1789 and was opened for students in 1793. These are the oldest of the state universities. Though the University of North Carolina was

YALE AND THE UNIVERSITY OF VIRGINIA



Yale University began as a school in 1701, and classes were taught in different places. A lot was bought at New Haven in 1716, and the institution was called Yale College, in honor of Elihu Yale, who made liberal gifts. The college grew slowly at first, but for a long time has been one of the leading institutions in the country. Phelps Hall, through which is an entrance to the quadrangle, is one of the many buildings.



The University of Virginia owes its beginning to Thomas Jefferson, who planned not only the buildings, but the course of study as well. It is located on the edge of the mountains at Charlotteville, Virginia, and was opened in 1825. All the buildings fit into the general plan of President Jefferson. For a long time the University had no president, but members of the faculty took turns in presiding.

the first institution to be called a university, Pennsylvania was already open for students.

MANY STATES ESTABLISH UNIVERSITIES AT PUBLIC EXPENSE

In the years that followed, nearly every Southern and Western state established a state university. As new states were admitted to the Union, Congress set aside great tracts of land to support a university in each state. Some of the states sold the land for very little, but others held on to it until it became very valuable. All the people of these states pay taxes for the support of the universities also, and some of the universities have very large incomes.

We cannot name all the state universities. There are now about forty of them, and so it would be easier to name the states that do not have them. New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Maryland and Delaware have no state universities, though little Delaware has a state college. The University of Pennsylvania is partly supported by the state. There is a University of Porto Rico, and a University of the Philippines. We show you a picture or two of some of the state universities, but we do not mean that these are better than any of the others. Some we have not named are quite as good. The same is true of the other institutions we show.

MANY SUBJECTS TAUGHT IN THE STATE UNIVERSITIES

These universities teach many subjects to their students, and many of them have summer schools where teachers and others come to study for a few weeks. Some have short courses in agriculture to which farmers come to learn better methods of caring for their cattle and other live stock, or to learn new things about planting and cultivating their crops. These universities will teach any subject which will be of benefit to the people of their states. Many of them have several thousand students, and have gained high reputations for the quality of their work.

Several of the larger cities support colleges or universities. The City of New York has a college for men and another for women. Charleston, South Carolina, and Cincinnati, Toledo and Akron in Ohio, also have colleges or universities supported by city taxes. Several other cities in different parts of the country are discussing the question of founding city colleges so that their boys and girls may go beyond the high schools at home.

We have mentioned the colleges and universities founded by churches and those by the states and cities. Now there is another kind founded by wealthy men, who wished to do good with their money. The largest and most important of these are Johns Hopkins University, at Baltimore, Leland Stanford Junior University, at Palo Alto, California, and the University of Chicago. There are many others. Cornell University, at Ithaca, New York, was partly founded by an individual, and partly by the state. It has also received many large gifts.

GIRLS MAY NOW GET A COLLEGE EDUCATION

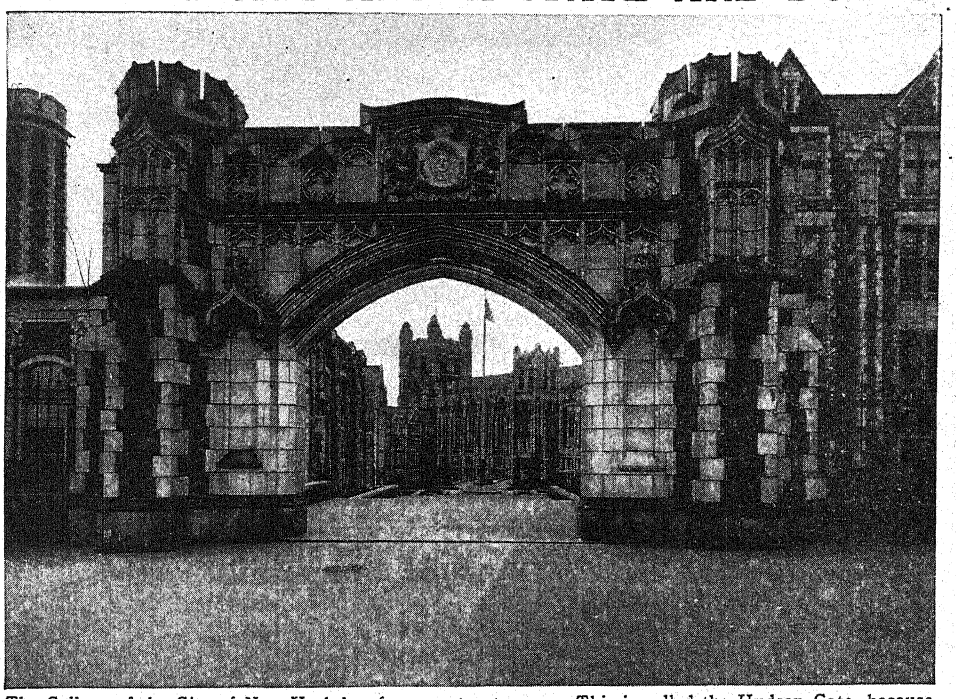
Not many years ago there was little chance for a girl to get higher education. She was not admitted to the colleges with her brothers, and the schools for girls were not very good. All that is changed now. More than half of the colleges admit both women and men, and there are some colleges for women, quite as good as the colleges for men only. The largest and best known of these are Vassar, Wellesley, Smith, Bryn Mawr, and Mt. Holyoke. A special college for women is a part of several universities, as Radcliffe at Harvard, and Barnard at Columbia. There are several other colleges for women which have high standards. So to-day a woman can get an education almost as easily as a man. The girls at these colleges enjoy themselves quite as much as their brothers do at their colleges, if not more.

COLLEGES OF OTHER KINDS OF WHICH WE CANNOT SPEAK

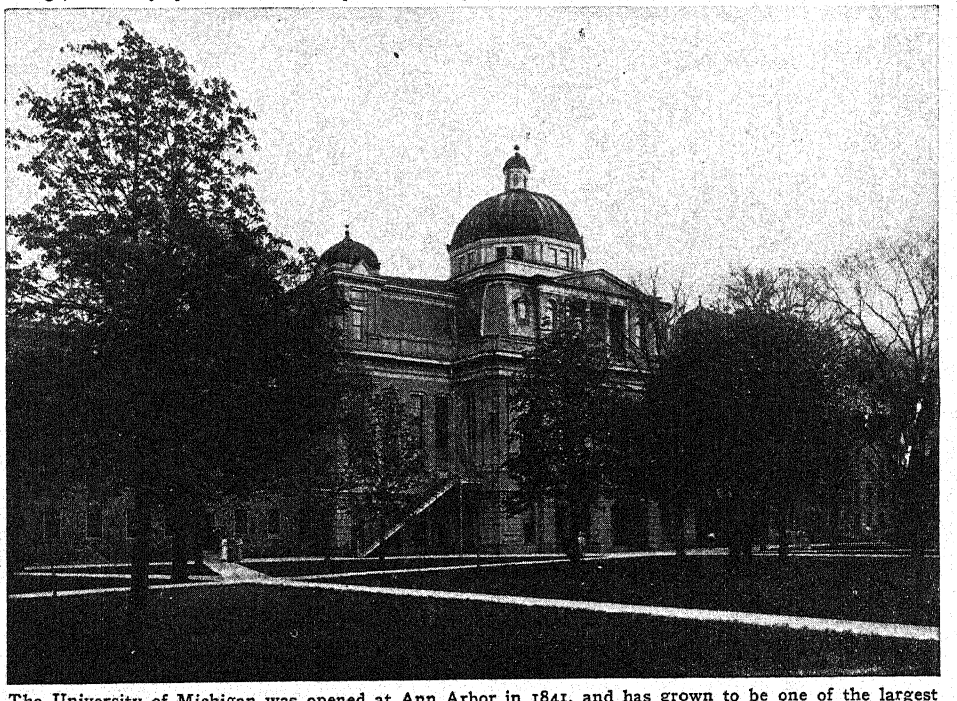
We cannot stop to tell you of another kind of college to teach agriculture and mechanics, which is found in every state. The United States government has helped to found these. In some states, such a college is a part of the university; in others it is separate. We have not time to tell of the schools which teach science and engineering. Enough has been told to show you that the United States certainly has colleges enough—perhaps more than can be supported properly, for it takes a great deal of money to support a college. When fees are charged they are never large enough to pay more than a small part of the expenses.

THE NEXT STORY OF THE UNITED STATES IS ON PAGE 4665.

WHAT A CITY AND A STATE ARE DOING

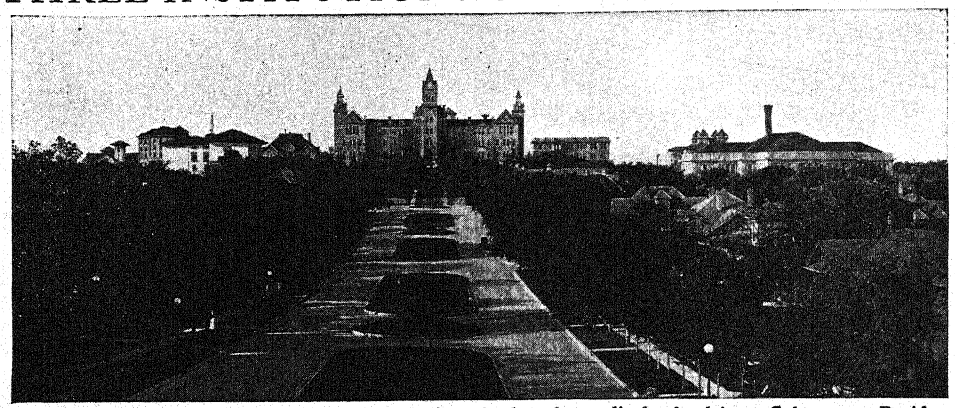


The College of the City of New York has four great entrances. This is called the Hudson Gate, because one coming out of the campus has a view of that river. This college is supported by the city of New York and is free to any New York boy who is prepared to enter. There is also a night college, a summer college, and many special courses are open to the employees of the city. Some courses are open to women.

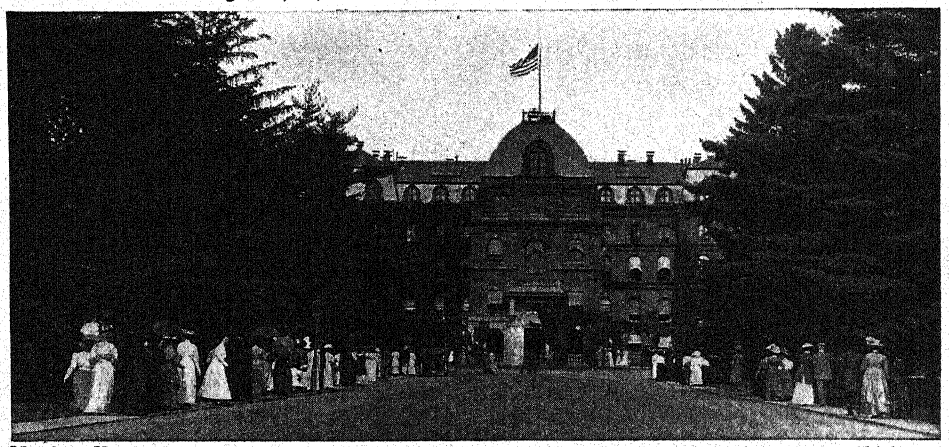


The University of Michigan was opened at Ann Arbor in 1841, and has grown to be one of the largest state universities, with many departments, dozens of buildings and hundreds of instructors. This was one of the first institutions to open its doors to women. This was done in 1870, and over 4,000 women have received degrees. This is one of the older buildings, and was considered a marvel in those days.

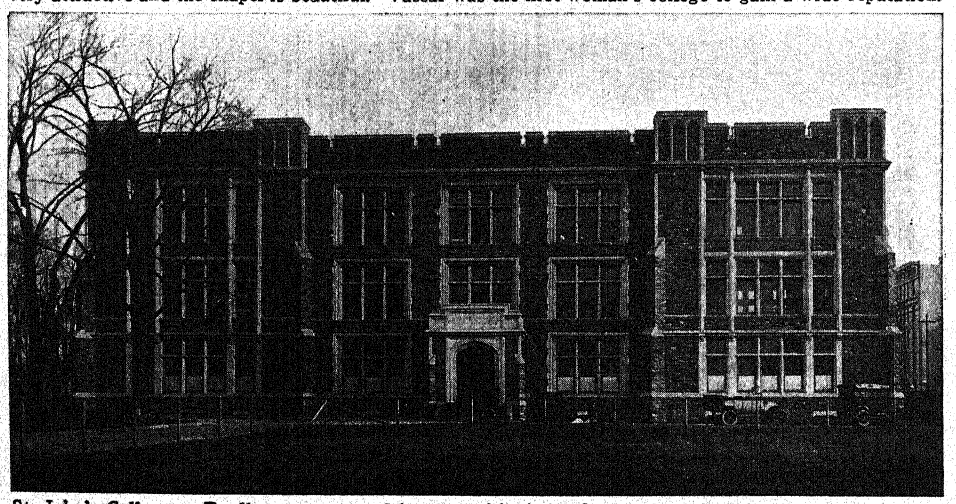
THREE INSTITUTIONS OF DIFFERENT KINDS



The University of Texas was opened at Austin in 1883, but the medical school is at Galveston. Besides the college there are schools of engineering, architecture, law, medicine and education. It is open to women also. The state gave 2,000,000 acres of land to found the institution, which is now very large.

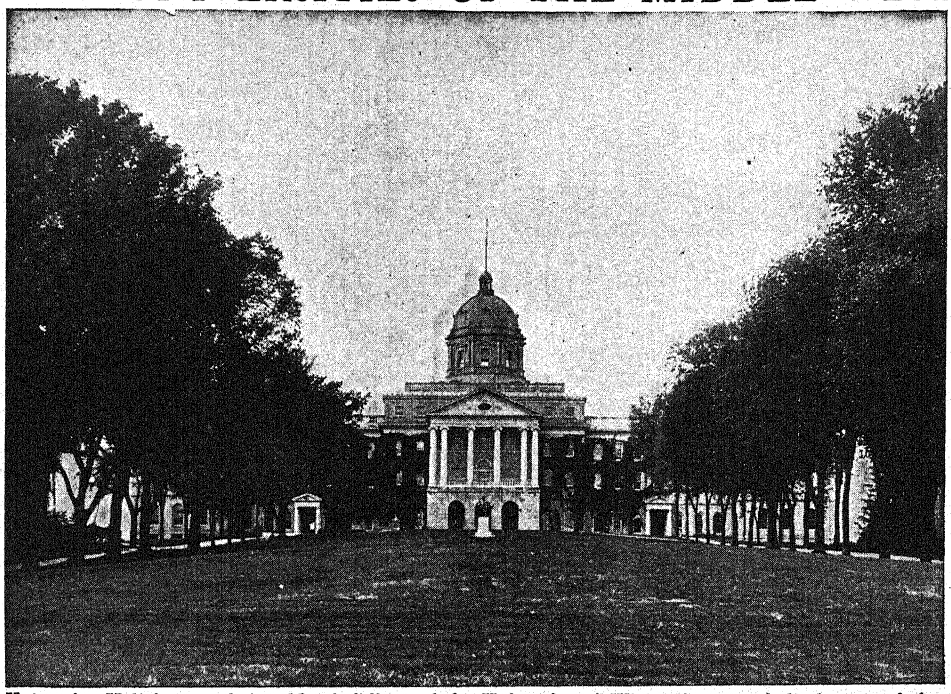


Matthew Vassar, in 1861, gave 200 acres of land and $788,000 to found a college for women, which was named for him. This building, which stretches far to right and left behind the trees, was at first the only one, but many men and women have since given money, land and buildings. Some of the dormitories are very attractive and the chapel is beautiful. Vassar was the first woman's college to gain a wide reputation.

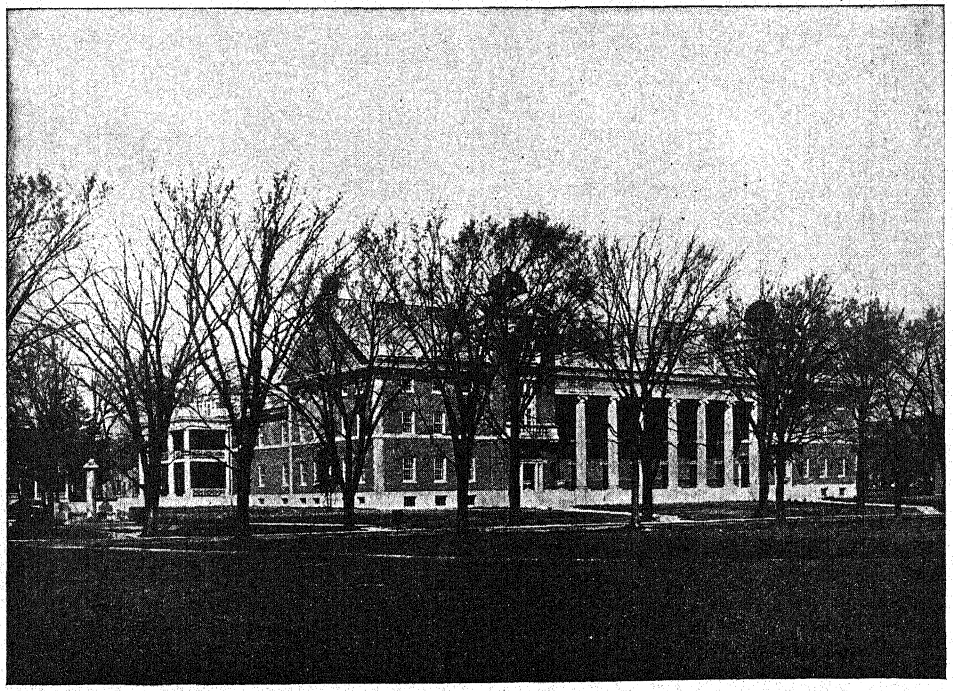


St. John's College at Fordham was opened in 1841 with six students. As city and college grew, it was decided to open schools of law and medicine, and, in 1907, the name was changed to Fordham University. It is now under the control of the Society of Jesus. This is the new building of the School of Medicine.

TWO UNIVERSITIES OF THE MIDDLE WEST



University Hall is one of the older buildings of the University of Wisconsin, one of the largest of the state universities. It is situated at Madison, the capital of the state, and has about forty large buildings, hundreds of instructors, and thousands of students. Besides the college department there are schools of medicine, law, agriculture, engineering and many others, besides a graduate school. The library is good.

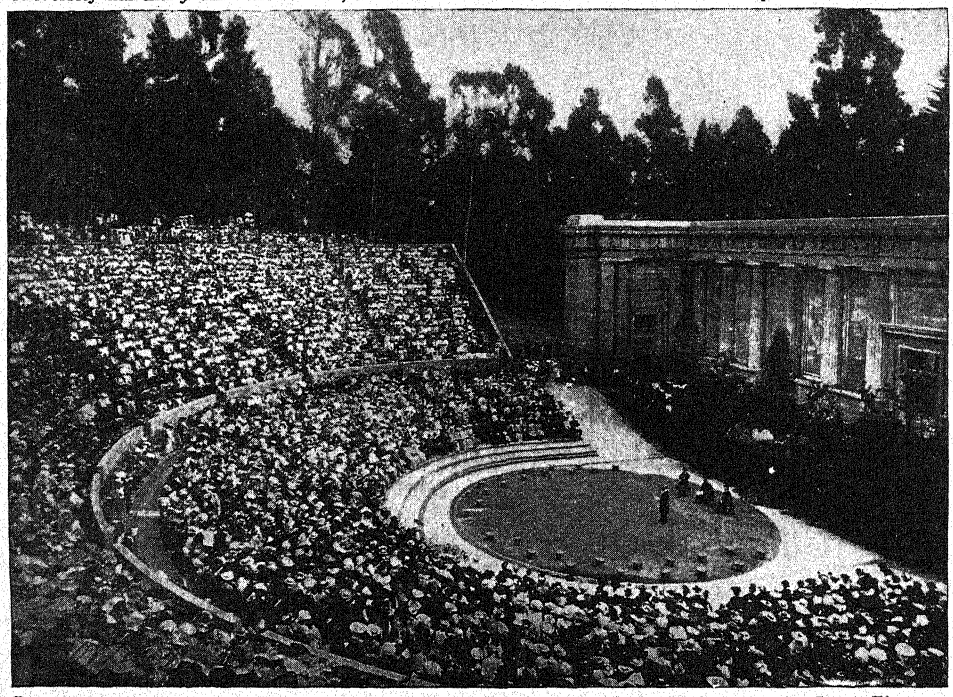


The University of Illinois, like most of the state universities, admits women, and this is the building set apart as a home for them. Though Illinois is now one of the older states, it did not fully establish a university until 1885. The University is situated between Urbana and Champaign, though some of the departments are in Chicago, and counts its students by the thousands.

TWO UNIVERSITIES OF THE FAR WEST

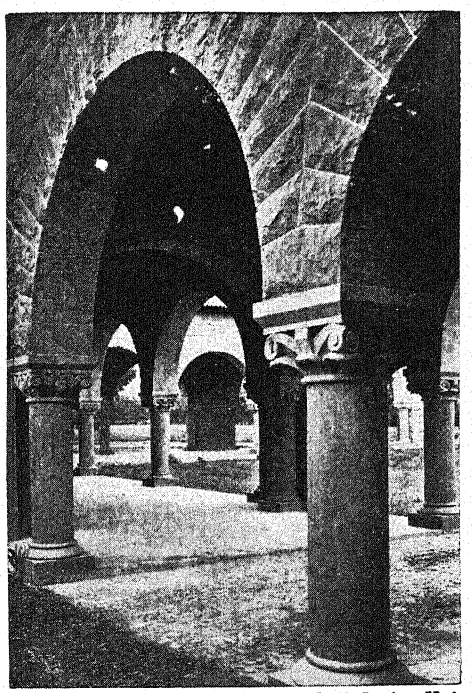


The University of Washington was founded before the state was admitted to the Union, but did not grow rapidly in the first years. It is now one of the leading state universities. This picture shows a part of the immense campus inside the city of Seattle. The University will not be cramped as it grows. The University has many different schools, and was one of the first institutions to teach journalism.

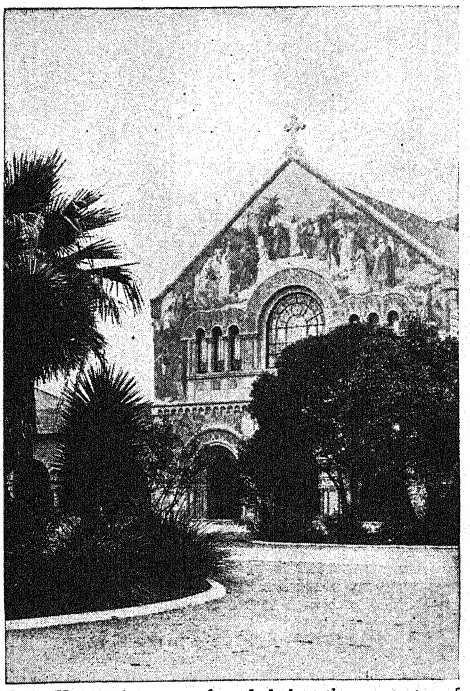


One of the most unusual buildings, if it is a building, at the University of California is the Greek Theatre, used for plays and meetings. The theatre is like those of ancient Greece, in which the plays of the great Greek writers were given. The University is situated at Berkeley, and has a fine view of San Francisco and the Golden Gate. It has thousands of students in its many schools, some of which are in other towns.

GLIMPSES OF A CALIFORNIA UNIVERSITY



The buildings of the Leland Stanford Junior University, at Palo Alto, California, follow the old Spanish mission style of architecture. All of the many buildings are connected by arcades of stone.



The University was founded by the parents of the young man whose name it bears as a memorial. The Memorial Church is one of the most lavishly decorated buildings in the United States.



Senator Stanford gave his Palo Alto estate of 9,000 acres as a site for the university, and a large tract has been reserved as a setting for the buildings. The many low buildings, connected by arcades of stone, are arranged in two quadrangles, one inside the other. They form a pleasing architectural group, and the beauty is increased by luxuriant vegetation. The lawns are bordered with a dazzling display of flowers.

LITTLE PICTURE-STORIES IN FRENCH

First line: French. Second line: English words. Third line: As we say it in English.

Un jour Georges alla promener son chien. Il rencontra un garçon boucher.
One day George went to walk his dog. He met a boy butcher.
One day George took his dog out for a walk. He met a butcher's boy.

Il portait de la viande sur un plateau. Pat sauta et vola un gigot.
He was carrying of the meat upon a tray. Pat jumped and stole a leg of mutton.
He was carrying some meat on a tray. Pat jumped up and stole a leg of mutton.

Pat décampa dans la rue ; Georges courut après Pat et le garçon après Georges.
Pat decamped into the street ; George ran after Pat and the boy after George.
Pat ran down the street ; George ran after Pat and the boy ran after George.



Un petit garçon traversait la rue avec une grande boîte sur la tête.
A little boy was crossing the street with a large box upon the head.
A little boy was crossing the road with a big box on his head.

Le méchant Pat courut au garçon, le fit tomber et renversa la boîte.
The naughty Pat ran to the boy, him made to fall and upset the box.
The naughty Pat ran up to the boy, knocked him over and upset the box.

Le garçon était très furieux. Il se releva et suivit Pat pour le frapper.
The boy was very furious. He himself raised up again and followed Pat for him to strike.
The boy was very angry. He picked himself up and ran after Pat to beat him.

Pat courut jusqu'à ce qu'il arriva à une femme qui vendait des pommes.
Pat ran until this that he arrived at a woman who was selling some apples.
Pat ran on till he came to a woman selling apples.



Pat fit tomber la corbeille de la femme et les pommes roulèrent sur la chaussée.
Pat made to fall the basket of the woman and the apples rolled upon the roadway.
Pat knocked over the basket and the apples fell out into the road.

La femme se releva et jetta la corbeille au chien. Pat était enfin attrapé.
The woman herself raised up again and threw the basket at the dog. Pat was at last caught.
The woman picked herself up and threw the basket at him. Pat was caught at last.

On le conduisit à la maison et son petit maître le punit de son espièglerie.
They him conducted to the house and his little master him punished of his prank.
He was taken home and his little master beat him for being naughty.



THE FRIEND OF THE SLAVES

CONTINUED FROM 4452



LADY BAKER

IT is the glory of Britain that she has done more than any other country to abolish the hateful slave trade, not only from her own possessions, but from the very face of the earth. Long after the slaves were freed in her colonies, as a result of the efforts of Wilberforce, the slave trade flourished as much as ever in Africa, and although it has been greatly checked, it is still one of the evils of the Dark Continent.

The first real step taken to stop the slave trade in Central Africa itself was made by Sir Samuel Baker, an intrepid English explorer, who, with his brave young wife, went to the stronghold of the traffic in Africa, and grappled with it there. In 1869, Baker was given, by the Khedive of Egypt, command of an expedition to suppress the slave trade, and he had under him a force of 1,645 soldiers; but the Egyptian officials in the Sudan, who made large sums of money by the wicked traffic, put every obstacle in the way of Sir Samuel Baker, and a man of less determination and spirit than himself would have given up the work in despair.

Everything seemed to go against the brave leader. The river fell low, and his steamers could not travel, and instead of leaving Khartoum with vessels and beasts of burden, he was compelled to go on without steamers and without a single transport animal. His British pluck, however, made him attempt what seemed the impossible, and the gallant Lady Baker, who was the first white woman ever to visit these parts, supported him heroically in his determination. Splendid work was done. On one occasion three boats, belonging to the governor of Fashoda, were seen approaching. Sir Samuel interviewed the governor and asked if he carried slaves on board. The official appeared greatly shocked, and said he was only collecting taxes. But when the vessels were examined, over seventy slaves were found on board, and eighty-four others were concealed on shore. This was an official who had declared to Sir Samuel that he had himself suppressed the traffic, and no slave trader dared have a station in his district.

Sir Samuel and Lady Baker released all the slaves instantly, to the intense joy of these poor people, and the bitter resentment of the governor.

At another time a vessel was seen passing far out in the middle of the river. She was stopped, and the indignant captain declared that he carried no slaves, but only grain. When the corn was prodded with a

ramrod from a rifle, there was a stifled cry from beneath the grain, and a negro woman was pulled out. The whole of the corn was then removed, and 150 slaves were released.

Sir Samuel soon found out not only that Egyptian officials were the principal slave dealers, but that the Government that had sent him to suppress the trade had given to a trader a permit allowing him the exclusive right to take slaves over an area of 90,000 square miles!

Treacherous officers in his own army and mutiny among the troops did not move him; and when he heard that the officers and men had determined to give up the expedition and return to Khartoum, thus leaving the slaves to their fate, he wrote in his diary: "Not a man shall go back, except by my orders." And yet, strong and firm as he could be, Sir Samuel was moved to tears by the sight of a little slave boy of eleven, who escaped to his boat, covered with wounds.

The force of 1,645 men was reduced to 502 all told, but the brave leader kept heart. "I did not despair," he says. "I determined that this reduction of military force should not paralyse the activity of the expedition, and that in spite of every intrigue I would succeed in the main object of the enterprize; the slave trade should be suppressed." Continuing south, he came with his wife and a small force to Masindi, near the Victoria Nyanza. The king appeared friendly, but Sir Samuel Baker felt it necessary to take precautions. The continued friendliness of the king disarmed him somewhat, and then one evening, while Sir Samuel was walking up and down, talking to Lady Baker, fire was opened upon them from the neighboring bushes. Fortunately they escaped, but the station was surrounded by thousands of armed blacks, who were repulsed only with difficulty.

Sir Samuel's good work has since borne fruit, for the slave trade has now been suppressed in the parts which he visited. At the close of his book on the expedition he says: "I must acknowledge the able assistance that I have received, in common with every person connected with the inland expedition, from my wife, who cared for the sick when we were without a medical man, and whose gentle aid brought comfort to many whose strength might otherwise have failed."

Livingstone, the missionary, in one of his letters, says of Baker: "He is now employed in a more noble work than the discovery of the Nile sources, and if he succeeds in suppressing the slave trade, the boon he will bestow on humanity will be of far higher value than all my sources together." Baker died in 1893, after many years of useful service.

A WOMAN WHO SAVED HER FAMILY

A LADY was spending a holiday in Switzerland with her two children, and one day, desiring to reach a valley on the other side of the mountains, she ordered a carriage to drive the family over the pass.

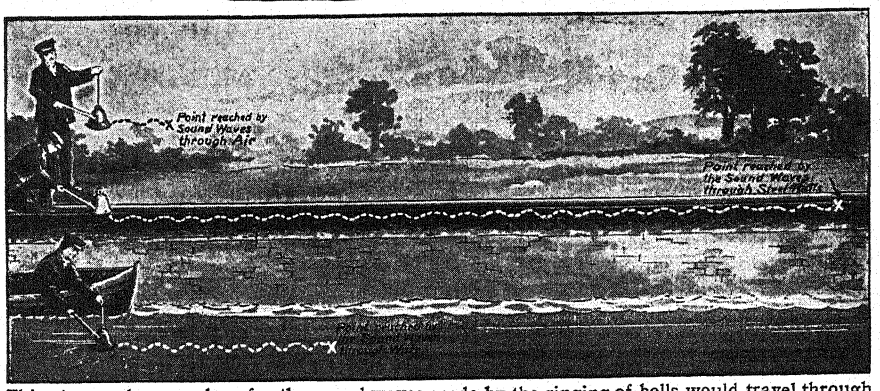
Now, most mountain passes have one or more dangerous spots on the road, where a driver has to use all his skill to keep his vehicle from falling off the narrow road into some depth below. In this case there were three horses to draw the carriage—a leader in front and two abreast behind him.

All went well till the carriage came to an awkward place in the road, where rocks overhung it on one side, and a steep precipice shelved down on the other into the valley hundreds of feet below. Just at the critical moment the leading horse became scared at something, turned aside towards the precipice, then, sticking his forefeet over it on the top of the incline, tossed his head and stiffened his body, preparatory to making a dash forward.

A scream from the children, and the poor frightened animal would have plunged them all into the valley below. The driver quite lost his presence of mind, and stared helplessly in front of him, as though he were paralysed.

But the mother in the carriage behind knew that a moment's delay meant death, and, with the courage born of mother-love, jumped out on the road, and, quick as thought, ran to the head of the leader, seized the bridle with her right hand, and, covering his eyes as well as she could with her left, spoke soothing words as she tried to back him up on to the road. She found this very difficult to do, but in the end she managed it, and so saved them all from impending destruction.

THE NEXT GOLDEN DEEDS ARE ON PAGE 4599.



This picture shows us how far the sound waves made by the ringing of bells would travel through air, steel, and water within a given time if the bells were all struck at exactly the same moment.

THE WAVES OF SOUND

CONTINUED FROM 4504



WHEN we study light we learn that in order to have light it is necessary that there shall be not only something outside our bodies, but also an eye to see that something. All Nature is in darkness except where there are eyes to see. In the same way, "the silence that is in the starry sky" is never broken on the earth except where there are ears to hear. We are now going to study the something outside ourselves to which the ear responds. We may call that something sound, but it is not really sound until there is an ear to hear it.

Just as light is a wave motion, so is sound, and certain facts which are common to all kinds of wave motion are therefore true both of light and sound, as we shall see. But otherwise the differences between these two kinds of wave motion are very great. Anything that carries, or conducts, or conveys, we may call a *medium*, which really means the "thing in the middle." Sound, then, unlike light and radiant heat, is a wave motion in a material medium. This medium is very often air, but it may be any gas or mixture of gases; it may be such a liquid as water, or it may be a solid body.

Where there is no matter there can be no sound, for sound is not conveyed by the ether. It follows that no disturbances on the sun or the moon could ever produce a noise that we could hear, because beyond the limits of our atmosphere there is nothing but the ether between us and these heavenly bodies, and though the ether conveys light, it cannot convey sound. When we say that sound is a wave motion, or a vibration, we make a statement which anyone who has seen or felt what happens when sound is produced will agree is true. For instance, we may hold a piece of string tightly, one end in each hand, and then suddenly pull it. It will actually be seen to vibrate as it produces a little musical note.

The same is true of a piano wire; or if we touch a bell or gong that has been sounded, we can feel that it is vibrating; also we know that, in such a case as that of a tumbler which has been struck, the finger which stops the vibrations stops the sound at the same time, proving that the vibrations are the cause of the sound. Every time the string or the bell or the gong moves, it gives the air a little kick, and so there is produced a series of waves which reach our ear, and which then become sound.

It is easy to prove that the air, and not the ether, conveys these waves. We may put an electric bell

inside an air-pump and set it going, and then we may start to draw the air away by means of the pump. As we reduce the amount of air surrounding the bell, our sight of the bell is not affected, because we see it by light which travels through the ether. But, on the other hand, the sound of the bell gradually becomes fainter, until at last it ceases altogether. The bell itself is vibrating as it was before, but if there is no longer any air around it, it cannot create those waves which we call sound. Then, if the air is gradually admitted again, the sound will return. This simple experiment teaches us not only what it is that conveys sound, but also that the loudness of sound depends largely on the state of the air.

When we have opportunities of comparing the speed of light and of sound, we find a great difference. We see the puff of smoke from a distant cannon many seconds before we hear the report of the explosion. Light travels so fast that, however distant the gun is, we see what happens in fractions of a thousandth part of a second. But sound travels comparatively at a very slow speed, which can easily be reckoned.

WHY SOUND TRAVELS MORE QUICKLY AT ONE TIME THAN AT ANOTHER

The speed of light and of radiant heat is always exactly the same in any circumstances, so far as we can discover. This, however, is not at all true of sound, the speed of which varies considerably with different circumstances.

We may notice at once that, fortunately for the art of music, the speed of sound varies only in very small degree with its pitch or with its loudness. It would be a very serious matter for the hearing of music if, when we were listening to an orchestra, the sound of the flutes reached our ears a beat or two before the sound of the double basses, which the composer meant us to hear together; or if a tune, being loudly played by one part of the orchestra, and softly accompanied by another part of it, reached our ears before or after the accompaniment.

The ordinary speed of sound through air is about 1,100 feet per second. As the temperature of the air rises, it becomes slightly more elastic; it rebounds better when struck, so to speak, and therefore the passage of sound through it—which entirely depends upon the elasticity of the air—is made easier. The speed of sound, therefore, increases somewhat with a rise in temperature of the air, so long as the air is of the same density. If we understand this principle of elasticity, we shall see why it is that sound passes more rapidly through liquids than through gases, such as the air, and still more rapidly through solids.

WHY A NOISE WILL TRAVEL FASTER THROUGH IRON THAN THROUGH AIR

Such a metal as iron, in the solid state, has much greater elasticity than air, and sound will travel through it about seventeen times as fast as through air. This means that waves of the same shape which pass through air, pass in and through the solid iron. Now, it is possible to make a confusion here about speed, and therefore we must just explain —though we have not really come to that yet—that the pitch of a musical note depends upon the number of waves which strike the ear in a second. This is quite a distinct question from the rate at which the waves travel through the air or anything else.

A given sound conveyed through iron will reach the ear seventeen times more quickly than when conveyed through air, but its pitch will be just the same in both cases, because the number of vibrations occurring in each second is the same in both cases, though they travel through the iron so much more quickly.

When we come to study the loudness of sound, we find that the first law about it is the same as the law of other wave motions, such as radiant heat or light. This law is true also of other things which are not wave motions, so far as we know, such as gravitation.

WHY WE HEAR WELL ON A CLEAR FROSTY NIGHT

In the exact language of science, the law is that "the loudness of sound varies inversely as the square of the distance." This is simply a neat and quick way of saying that if we walk three times as far away from the source of the sound as we were before, its loudness will be not one-third of what it was, but one-ninth of what it was, nine being the square of three. The square of a number is the number multiplied by itself.

That is all there is to say about the power of such things as light and gravitation; but in the case of sound other

things come in, for the density of the medium which conveys it is very important. On a frosty night the air is very dense. One consequence of this is that a motor-car runs better, because the engine gets a better supply of oxygen. Another consequence is that sounds are heard more loudly. On the other hand, the report of a gun high up among the mountains, where the air is rare, is like the sound of a Christmas cracker going off, a fact which reminds us at once of our experiment with the bell and the air-pump.

At the seaside, when we watch the waves rolling up against a breakwater or a cliff, we know that they may be reflected, or bounced back. Often the waves may be broken up, and what exactly happens will depend on the kind of surface against which they strike. But if it is a smooth, flat surface, we see that the waves are reflected from it, almost as a ball is from a wall. Now, if sound is really a wave motion, and if calling it that is more than merely making a sort of picture of it in our minds, we should expect that it could be reflected, just as the waves of the sea may be; and this is indeed the fact.

THE WAY IN WHICH SOUND WAVES ARE BEATEN BACK FROM A WALL

All wave motions can be reflected. What is true of sound is as true of radiant heat and of light as it is of the waves of the sea. There are certain laws which apply to these very different cases. The first of these laws, when stated in scientific language, is that "the angle of incidence and the angle of reflection are equal." This means that the angle at which the wave approaches the surface is the same as the angle at which it will leave the surface.

The same applies to a billiard-ball striking the cushion of a billiard-table, or it applies to the most ordinary case of throwing a ball against a wall. If we throw the ball straight at the wall, it comes back straight; if we throw it slantwise, it comes off the wall slantwise; and if the wall is flat and the ball has no spin on it, and if we could measure the angle at which the ball approaches the wall and the angle at which it leaves, we should find them the same.

This is equally true of sound and radiant heat and light. One of the points to notice is that the level, or plane, as we say, in which the wave approaches the surface that reflects it, is the same as that in which it comes off. For instance, suppose the sound were running along on the level of this paper, and then struck obliquely, or slantingwise, a wall at the edge of the paper; it would come back not only at the same angle as that at which it approached the wall, but also it would come back still traveling on the level of the paper—not bent upwards or downwards so as to travel either above or below it.

HOW THUNDER FROM THE CLOUDS IS THROWN BACK BY THE EARTH

This is true also of light and radiant heat. We all know that sounds seem different in the open air when compared with sounds in a closed room; we know how different our voices sound in different places. All this is a question of the reflection of sound. But the most striking way in which we can prove to ourselves that sound is reflected is in hearing an echo.

One of the ways, indeed, in which we can test for ourselves the rate at which sound moves is to make a sound at a certain distance from an echoing surface, and then notice how long it takes for the echo to reach our ears. There are echoes in Nature besides those which we make ourselves, and the best instance of reflection of sound causing an echo is a peal of thunder.

Thunder is a disturbance in the air forming a sound, made by the passage of lightning from cloud to cloud, or from cloud to earth. If there is no echo, we simply hear a single clap of thunder, corresponding to the single instantaneous cause of it. When we hear a peal, we simply hear that clap echoed again and again from cloud and earth.

THE ECHO OF MUSIC ON THE WALLS OF A GREAT HALL

In places made for speaking or for music, echoes are often a very great nuisance. All our success in listening to a speaker, and all our pleasure in listening to music, depend upon the absence of any echoes that can be noticed. In one of the most famous halls in London, for instance, it is almost impossible to hear music with pleasure, because of the echoes from the smooth surface of its circular wall.

Thus, when a player strikes a single chord upon a piano, it sounds in almost

every part of the hall like a quickly repeated chord. This interferes not only with the hearing, but also with the production of music in such a place Even at the best, everything is more or less blurred, as it is when an unskilful player plays on the piano, and keeps the loud pedal on all the time.

THINGS THAT MUST BE REMEMBERED AT GREAT MEETINGS AND CONCERTS

The case is still worse in listening to a speaker, because everything depends upon our hearing each syllable, apart from any echoes of words previously spoken. Therefore, many devices have to be adopted in order to prevent, as far as possible, the reflection of sound in such cases. Tapestries and hangings, and so forth, are bad reflectors of sound, and may be of service; wires stretched across the hall above the heads of the audience may often help to break up the sound waves, so that they are, at any rate, not reflected from the roof.

The people themselves, by their mere presence, improve the properties of a hall for speaking and singing, because their bodies form a broken surface for the floor of the hall, and the sound waves are broken up, just as the waves of the sea are broken up when they strike an irregular cliff as compared with a flat breakwater.

Recent careful study in France has shown the way in which a hall ought to be built so that the reflection of sound may be useful rather than the reverse. When the surfaces are far away from the speaker or the musician, as the Carnegie Hall, New York, time is taken in the reflection, and so a distinct echo is heard. But if the sound is produced quite close to a curved surface, as in the case of many churches, then the echo, or reflection, occurs so quickly that, instead of being heard by the ear as an echo interfering with everything, it blends with the sound of which it is an echo, and simply makes it clearer.

TWO MEN WHO TALKED TO EACH OTHER WHEN A MILE APART

There are other ways in which the principle of echoes can be turned to good account. Thus it is recorded that two Arctic explorers talked to each other at a distance of over a mile, their voices being beautifully reflected from the smooth sheet of ice between them. The celebrated Whispering Gallery of the Capitol, at Washington, is really an illustration of the very same thing. Lastly, the principle of echoes, or the reflection of sound, is invaluable in every case where we employ anything of the nature of a trumpet. The use of the outer ears of animals depends upon the reflection of sound, as do the artificial ear-trumpets made for deaf people. Sound is reflected from side to side of the ear or the ear-trumpet until it reaches the place where it is desired to be heard.

The echoing, or reflection, of sound applies equally where the trumpet is used, not in catching the sound, but in making it, as, for instance, in the speaking-trumpet used at sea, or the speaking-trumpet—for it is exactly the same thing—which is put opposite the sounding part of an old-fashioned phonograph or gramophone.

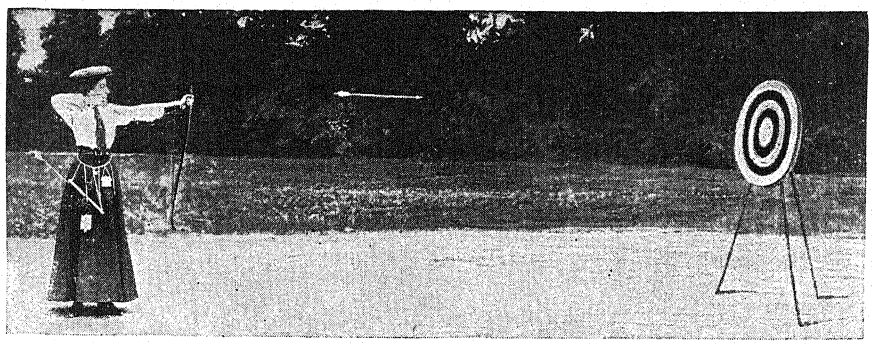
We know that light may not only be reflected, but also bent, or, as we say, *refracted*. That is what happens when we concentrate the light of the sun by means of a burning-glass on a piece of paper; and it also happens in many other cases. Now, it is very interesting to discover that sound can be refracted, or bent, in its course, just as light can. The refraction of light is extremely important, and we shall have to study it carefully; the refraction of sound is of no practical importance, but it is interesting because it teaches us about wave motion.

AN EXPERIMENT WITH A SWINGING BALLOON AND A WATCH

If we take a big bag or balloon, and fill it with carbon dioxide, we find that this bag acts towards sound just as a lens acts towards light. The sound waves will be bent by the gas in the balloon, and they will be brought to a focus on the other side of the balloon, just as sunlight may be brought to a focus on a piece of paper by means of a burning-glass.

Thus, as in a well-known experiment made by Lord Rayleigh, one of the greatest students of sound, we may stand opposite a watch at such a distance that we can hear nothing. But if a balloon filled with carbon dioxide is made to swing slowly from side to side between us and the watch, and if we are just at the right distance, then, whenever the balloon is in the middle of its swing, and focuses the sound waves, we shall hear the watch ticking.

THE NEXT PART OF THIS IS ON PAGE 4869.



WHAT MAKES AN ARROW FLY?

CONTINUED FROM 4488



THE motion of the arrow through the air is a kind of power, and that, like all other power, has to come from somewhere. It was not in the arrow when it lay in the quiver, nor even when it was put in the bow; but when the cord was released and pushed the arrow, the arrow got its power of motion.

The power, then, came from the stretching of the bow; for if the bow were not stretched it would not drive the arrow; and so, if we trace the power backwards, we find it came from the strong muscles of the archer who bent the bow. But the question for us is: What happens in the bow when it is stretched? All we can say is that when the cord and the bow are bent out of their natural shape by being stretched, they somehow carry in themselves, ready to act, the power they have got from the muscles which stretched them.

The same applies to many other cases where there is hidden power. If we carry a stone from the bottom of a cliff to the top, there is even less difference in its appearance than there is when a bow is stretched; yet it is different, for it has the power we put into it when we carried it, and if it drops from the cliff on our head, as we walk below, we shall be sure that that power is something real.

DOES A ROCK BREATHE?

At first sight, this seems to be rather an absurd question, because we always associate breathing with living creatures, and rocks are certainly not alive in the ordinary sense of the word. It really rather depends on what we mean by the word breathe. Rocks have no lungs; they do not take in oxygen and give out carbon dioxide as we do; but if by breathe we simply mean take in oxygen, then the answer to the question is Yes.

Long ages ago, the rocks took in huge amounts of oxygen when they were being formed. It is reckoned that there is enough oxygen contained in a layer of rocks a few feet deep to equal the amount of oxygen in the air above them.

This process of the in-take of oxygen from the air by rocks still goes on in some degree, and it helps in part to explain why many kinds of rocks crumble and break down and wear away from year to year, especially when we take the wearing action of rain and wind into account as well.

WHAT MAKES THE SEA ROAR?

Roaring is a kind of sound, and though sound is a something that can travel in all kinds of matter, it is usually, as we know it, a wave in the air, because, as a rule, our ears are not pressed up against any solid thing, nor are they under water, and so all sounds that reach them must reach them through the air. This is

true when we hear the sea roaring, though a swimmer, when he goes head first through a wave, may hear a roaring coming through the water when he is below the surface. Everywhere the surface of the water is in contact with the air, and if the water moves at all violently it may start in the air those kinds of waves which our ears can hear and which we call sound. These waves are of the kind that are not very numerous in each second, and so they make sounds of low pitch which we call roaring. Sometimes, when a wave breaks, a great volume of water may fall upon the rest of the water, and so make a sound which is more like an explosion than a roar.

Tennyson wrote once about what he called "the scream of the maddened beach"; and it is very interesting to notice that we do hear on the beach sounds which are much more like a scream than a roar, though the sea itself never screams. It is the beach, and not the water directly, that makes the scream, and the kind of scream will depend on the kind of beach. Soft sand will not scream, but where there are pebbles of certain kinds, as the waves move up and down they rub the pebbles against each other, and that produces air-waves of a quicker rate, which may be likened to a scream.

WHY DOES WATER SWELL WHEN IT IS HEATED?

It is not true that in all cases water swells when it is heated, because if we take water at the freezing temperature, and then slowly heat it, we find that, instead of swelling, it shrinks until it reaches the point which is called 4 degrees on the centigrade scale of temperature about which we read on page 1937. That, however, is a special exception, and it is perfectly true that if we go on heating the water after 4 degrees centigrade, it does swell. This is true not only of water, but also of almost anything, whether a solid or a liquid or a gas.

We can find some kind of explanation for this if we think of heat as a to-and-fro motion of the tiny parts of which all matter is made. The hotter the thing, we suppose, the wider is this to-and-fro motion of its tiny atoms.

Suppose we have a crowd of children, and all the to-and-fro motion each of them makes is just so much as is required for breathing. Fifty such children could be packed together into a very small space; but if, instead of making only this little movement, each of them wanted all the time to be making little runs of five yards backwards and forwards, we should plainly not be able to pack these fifty children into as small a space as before, and the bigger the run that each of them wanted, the more space they would require to take up.

If, instead of children, we think of the atoms of matter, and if we think of heat as these atoms of matter running to and fro, we shall see why water and other things swell when they are heated. No one knows what special arrangements are made in the case of water between 0 degree and 4 degrees centigrade.

WHY DOES SHALLOW WATER FREEZE FIRST?

When the air is very cold, it gradually takes heat away from the water which is exposed to it, and so that water becomes colder. The earth beneath the water is much warmer, as a rule, than the freezing air, and so we expect to find the coldest water at the top, where the heat is being lost, and the warmer water below.

When water is cooled from 4 degrees centigrade down to the freezing-point, it does not become heavier, and so sink, as we should expect; if it did, a pond would freeze from the bottom upwards. On the contrary, it grows lighter and floats, and so a pond freezes at the surface. But, short of cooling the water down so near to the freezing-point as 4 degrees centigrade, the water is, of course, becoming heavier all the time it is cooling, and, being heavier, it must sink, while the warmer water takes its place at the top.

This means that the whole thickness of the water must be cooled down before any of it will freeze, and therefore the shallower the water is, the quicker it will freeze. The little puddle in the road freezes quickly, but the deep pool will not begin to freeze until the whole depth of its water has been cooled.

WHY DOES THE SEA NOT FREEZE?

Sea-water, like any other kind of water, can freeze, and it does freeze if the conditions are right; but there are some good reasons why the sea does not freeze nearly so easily as a pond or lake, or even a river. It is not the salt in sea-water that makes the difference so much as the

depth and constant motion of sea-water. Until the whole depth of a quantity of water has been cooled down it cannot begin to freeze, for, until it has all cooled, the warmer water, being lighter, must always come to the top. Therefore, when water is very deep, it is very difficult to freeze, and thus the great depth of the sea, in many places amounting to several miles, is one of the chief reasons against its freezing.

But the sea is also in constant movement under the influence of tides and winds and currents. The motion of water interferes very much with its freezing, though it does not interfere nearly so much as the depth.

But in the coldest parts of the earth's surface the sea does freeze, as we find in the records of those explorers, like Peary, Amundsen, Scott, or Shackleton and others who made Polar explorations. The same seems to be the case on our near and wonderful neighbor, the planet Mars, for we can see through our telescopes the ice or snow-caps at each of its Poles, like the ice at our own.

ARE THE CLOUDS PART OF THE EARTH, AND DO THEY GO ROUND WITH IT?

Certainly the clouds are part of the earth. We use the word earth in two senses—sometimes to mean the great ball on which we live, and sometimes to mean the soil—and these senses confuse us, so that sometimes we forget that we do not really live on the outside of the earth at all, but only at the bottom of its outside layer, which we call the air or the atmosphere.

That outside layer, and all it contains, such as the clouds, is as much part of the earth as the mountains or the oceans are. It is true that, from our particular point of view, we may think of the air as something laid on outside us to serve as a parasol by day to shield us from the heat, and a blanket by night to shelter us from cold, as it does; but then our point of view only depends on where we happen to be, and we must not go by that.

The clouds, being part of the earth, go round with it, as does the atmosphere in which the clouds hang. No doubt it is true that, as the earth spins, the air tends to drag behind; and high clouds will do this also. But, in general, the air and the clouds certainly spin round with the earth If this were not so, there would be a gale so tremendous that we could not live at all, nor could one stone lie on top of another.

WHY IS RUNNING WATER PURER THAN STAGNANT WATER?

Though we think of water as a thing which does not do much, yet, in point of fact, it is always doing things. It is the great supporter of life, in the first place. Also, it is the great dissolver of gases and of solids from the air above it, and from the ground beneath it, and these gases and solids help to support life. So stagnant water very quickly becomes filled with living creatures and with the products of their lives. We call it impure just because that does not happen to be the kind of water that we prefer to drink. But really, though we give it a bad name, it is doing the great work of water on the earth.

Even the water we call pure contains a great number of other things in it besides water, and that is especially true of running water, which is rich in gases. It is probably not very long since running water existed in the form of rain, which is much the purest of all the natural forms of water, although it also contains a certain amount of dust, and always a certain quantity of the gases in the air dissolved in it.

It is the gases in running water that make it so nice to taste, and this really makes more difference than we think. The Chinese long ago said that the proper way to make tea was with water taken from a running stream. If we compared such tea with tea made from pure distilled water, we should think the latter was a very poor drink indeed.

WHY DOES A CRUST FORM ON HEATED MILK THAT IS LEFT STANDING?

The crust that forms on milk which has been heated is a definite and very valuable chemical substance. It is a protein, or albumin, and is called lact-albumin, from the Latin word for milk. It has the property of turning solid, or clotting, when it is boiled, and then it floats on the top of the milk, and forms the crust which so many people dislike and throw away. Lact-albumin is not the only protein of milk, nor the most abundant, but it has special advantages.

The life of many a baby that cannot digest the other protein of milk is saved by the use of this lact-albumin. When milk has rennet added to it, forming what we call curds and whey, the other

protein of the milk is clotted and helps to form the curd; but in this case the lact-albumin is not clotted, and remains liquid in the whey. That is why it is sometimes called whey-albumin. Babies and invalids who are unable to digest any other kind of protein—and without some protein no one can live—can almost always digest whey and its albumin. Therefore, to throw away the skin that forms on heated milk is simply a wilful waste of one of the best things in the milk.

Not only children, but also many grown-up people feel very strongly on this subject, though the " skin " has no taste. But certainly we ought to do our best to persuade children to take the skin, though the best way of all is to have pure milk, which does not need to be heated. That will be the case some day, but it is not yet; and, meanwhile, most milk should be heated to a very high temperature, even if the " skin " is wasted.

WHY DOES THE SUN MAKE CARPETS FADE AND NOT FLOWERS?

The color of carpets is due to the presence of special chemicals that have the color which is desired. It is as if we took a handkerchief and soaked it in ink, and then allowed it to dry. The chemical substances that are dissolved in the ink give the handkerchief its color. Now, the sun has in itself the power of altering the dyes in a carpet or a curtain, and if it alters them enough the color of the thing changes.

But there are dyes which are fast, as we call them. This simply means that the sun does not do anything to them, and the beautiful dyes which plants use to color their flowers are all fast dyes; at any rate, they do not fade while the flower is alive.

IS THE EARTH GROWING SMALLER?

The answer to this question is Yes, but we must understand what we mean by smaller; we mean actually smaller, and not less heavy, for that is another question. The earth might become smaller by shrinking without losing any of the stuff which makes it, or it might become smaller because part of the material of which it is made has been lost. It might shrink smaller, or it might wear smaller, so to speak.

We are certain that the earth is shrinking smaller, because we know that it is slowly losing heat and growing colder, and if it does this it is bound to shrink. We suppose that the great cause of earthquakes is the shrinking of the inside of the earth as it cools, so that the crust on which we live is left not sufficiently supported.

As regards the possibility that the earth is wearing smaller, we cannot doubt that it does slowly lose a certain amount of the gases of the atmosphere by a sort of leakage from the outside layers. But, on the other hand, certain things reach the earth and add to its amount from outside space; and, for all we know, the earth may be actually gaining more in this way than it loses in the other way.

It has been known for many years that the earth lives in a more or less constant shower of meteors, and these become part of the earth when they reach it. That is true whether they reach the solid earth or whether they are burned up completely in the air. Also, we now believe that the sun is always shooting out tiny particles of atoms, called electrons, in all directions, and our earth catches a very great number of these.

ARE PICTURES OF THE THINGS WE SEE PRINTED ON THE EYES?

The word photograph means a light-picture, and that is exactly what photographs are—pictures printed by the light on a film or a plate. This film or plate is covered with certain chemical substances which are affected by light, according to its power and the place where it strikes. The back part of the eye is in these respects the same as the photographic plate. It also contains chemical substances which are changed by light. They are not the same substances as are used on any photographic plate or film, but the principle is exactly the same. Therefore it is perfectly true that pictures of what we see, such as a house or a landscape, are printed on the eye.

But there is a tremendous difference between the retina of the eye and the plate of a camera. If the picture printed on the eye stayed for any length of time, of course we could not see anything moving. If we went to a moving-picture exhibition, where many pictures in succession passed in front of the eye in each second, we should get a blurred picture in just the same way as if we

took a picture of what the biograph shows on a single photographic plate. If our eyes are to be useful, it is absolutely necessary that the pictures printed upon them should be no sooner made than they fade completely away, and leave the plate, so to speak, ready for another picture. This is where the wonder comes in—that it should be possible, in a tiny fraction of a second, for the back of the eye continually to remake, from the materials supplied it by the blood, the chemical substances which light affects when we see.

WHEN A STONE IS THROWN UP, WHAT KEEPS IT IN THE AIR BEFORE IT DROPS?

It would be more reasonable to ask: Why does the stone ever return? We shall understand the case by seeing what actually happens when the stone is thrown, and we must be careful to hold hard by Newton's first law of motion, which says that a moving thing must go on moving in the same straight line at the same speed for ever, unless something stops it. When the stone is thrown, motion or power is put into it, and Newton's law—the law that all power has to be accounted for—teaches us not to wonder what keeps the stone up in the air, but to expect that it will go on moving until it leaves the earth altogether.

Two causes, one much more powerful than the other, bring it back. One is the resistance of the air, which the stone pushes against as it rises, and which thus has some of the motion of the stone drained away into itself. The other is the earth's gravitation, against which the force in the stone has to fight until it is exhausted. Then the stone returns, but the power that was in it has not gone, as we soon discover if it happens to fall upon our head.

WHEN WE FEEL COLD, IS OUR BLOOD COLD?

Our feelings of cold or heat come, as a rule, from the very surface of our bodies. What we judge by is what happens to the skin. If the skin is losing heat quickly, we say we feel cold, and if it is losing heat very slowly, or actually gaining heat, we say we feel hot. The blood is the most important thing which decides how the skin feels, as a rule; but, of course, in special cases the skin is more affected from outside than from inside, as when we are in a cold draught or exposed to a fire. When we feel cold, our blood is not cold. It is as warm as usual. Only very little of it, however, is passing through the skin, and that is why the skin feels cold. Perhaps we are in cold surroundings, and the body is keeping most of the blood to warm the great organs like the brain and the heart, and the skin, which does not matter at all compared with them, has to go short.

In certain illnesses the case is very striking. In malaria, for instance, there is usually a shivering stage, when the person feels very cold. His skin also is pale, and there is very little blood in it, and that is why he feels cold. But if we take the pains to find out in some way the actual temperature of his blood, we shall find that it is much hotter than it ought to be.

The person is, indeed, in the first stage of a fever. In the second stage this hot blood will flood the blood-vessels of the skin, and the quantity of it and the heat in it will make the person feel as hot as he previously felt cold.

WHY DOES THE SUN SHINE DURING SHOWERS OF RAIN?

"Why should it not?" said the Wise Man. The sun we know is shining, whether we can see it or not, by night and by day. If we do not see it, that is because something is in the way, such as the clouds that rain comes from. If these clouds cover the whole sky, we cannot see the sun, but if they do not, the sun may shine between them.

DOES A HEN KNOW THAT CHICKENS WILL COME OUT OF HER EGGS?

One of the greatest of facts in the animal world is what is called instinct, and the mighty difference between our minds and those of the lower animals is that in us instinct has become largely changed into a much more wonderful thing which we call intelligence. One of the most important facts about an instinct is that the animal goes through the action without knowing what its purpose is and what will come of it. If an animal could foresee the consequences of its acts, then it would be a reasoning and intelligent being, worthy to rank beside ourselves.

This is true of all instincts, that the action is done because something within the creature impels it to perform that

action, but with no knowledge of its use and purpose. Thus, when a baby instinctively sucks a bottle it does not know that the object of doing so is to supply itself with material and power for its life.

It may possibly be that in some cases an animal of the highest type, such as a dog or a horse, may notice, after a number of times, that certain consequences follow upon its instinctive actions, and so it may learn what will happen, just as we do after a time when we exercise our instincts.

But it is very unlikely that the hen, whether it be the first time or the twentieth time that she sits, has any idea except simply that things like eggs are very good to sit on. This is true, even though she is glad to see the fluffy little chickens when they come.

WHERE DOES ALL THE BAD AIR GO?

The answer to this question can teach us a great lesson about the meaning of words like good and bad. It is probably wisest and most reverent for us to believe that in the long run and in their right places all things are good. That, at any rate, is certainly very true of what we call bad air. By bad air we usually mean carbon dioxide, which has come from our lungs or from a fire or a lamp, or from the breathing of animals.

We may rightly call such air bad in a sense, because it is bad for us; if there is too much of it in the air any animal is given to breathe, the animal will die. But this carbon dioxide is moved about by the wind and also by the movement which is natural to its own particles, and so it is quickly distributed very evenly throughout the air. It is very remarkable indeed to find how similar and constant within small limits is the proportion of carbon dioxide in the air, wherever and whenever we have the means to examine it.

This gas is of the utmost importance for our lives, even though we rightly call it bad when it is in the wrong place and in the wrong quantity. Without carbon dioxide all the green trees and plants would soon die of starvation; then all the animals that live on plants would die; then all the animals that eat vegetarian animals would die; and, lastly, when everything else had died, we should die ourselves.

WHY DOES THE WIND BLOW MORE ON THE TOP OF A HILL THAN BELOW?

It is quite true that the wind blows more on the hills than below them, and travelers have reported that when they go to very great heights the wind becomes still more powerful. Where mountaineers have ascended as high as twenty thousand feet or more above the level of the sea, they usually find a tremendous wind blowing; and when the mountain is ascended on different occasions, this wind is always found to be blowing, and blowing in the same direction.

People who have gone up great heights in balloons or aeroplanes have not noticed the same gale around them as mountaineers have; but that is because the aeroplane or balloon moves with the wind, and so the wind is not noticed, especially if it is steady, and the balloonist at that height cannot always make out whether he is moving or not.

The explanation of all this seems to be that, as the earth moves, and different parts of it become heated in succession by the sun, and also owing to the movement itself, the air at a considerable distance above our heads is constantly moving and forming great winds. Lower down these winds are largely wiped out by the obstacles which the moving air meets on the surface of the earth, and also to some slight extent by friction of the air with the earth, which keeps the air moving in the same direction.

HOW CAN MEN FIND OUT WHERE A FAULT IS IN THE ATLANTIC CABLE?

We must imagine that, instead of an electric cable having a copper wire in the middle, we have a long tube, into which we pour water. We must imagine, also, that the end, or bottom, of the tube is hundreds of miles away, much farther than we can see. Even then we can tell how far off the bottom of the tube is if we know how much water we have to pour into it to fill it.

Just in this way clever men have found out how to tell the length of copper wire in an electric cable. They have instruments by which they can tell how much electricity has been put into a wire when it is full, and as they know how much electricity one mile or one yard of wire will hold, they can tell how far off is the end of the wire—that is, the place where it has broken.

THE NEXT QUESTIONS ARE ON PAGE 4689.



This picture of a group of Dutch merchants, called "The Syndics," some consider Rembrandt's greatest work. These traders seem quite real, and their characters are wonderfully depicted.

A TALK ABOUT PICTURES

CONTINUED FROM 4548

DRAWING is a very, very old art; it is a way of telling other people what the artist has seen or imagined. Before we can understand a book we have to learn to read; but drawing is a language that everyone, even quite small children, can read. Even as far back as the time when men and women lived in caves and wore skins of animals for clothes, they drew rough pictures on reindeer bones.

Then someone found out how to mix colors, very roughly, and these primitive artists tried to draw with colors, so as to give an idea of what they thought was the color of things.

Slowly, very slowly, men began to notice that painting could do more than this; they began to find that colors used in a certain way not only gave a picture of the thing seen, but gave it in some curious way, as music gives sound to the ear.

In the days of ancient Greece, and when Alexander the Great conquered the world, this art had reached wonderful perfection; but although we know from ancient books the names of many of the famous Greek painters, among whom Apelles, Zeuxis, and Parrhasius were the best, their works have perished. Only a remote idea of their mode of painting can be gained from the wall-paintings found at Herculaneum and Pompeii, which were executed by inferior Greek artists when the world-power had passed to the Roman Empire. We must remember, however, that probably Greek painters knew little or nothing about perspective.

In these long-distant days of ancient Greece and Rome, art, both in painting and sculpture, served so much for the glorification of heathen divinities in beautiful human shape that, when Christianity spread and gradually took hold of the people, it came to be considered almost sinful to represent the human body undraped; so that by-and-by the painters lost their skill in painting human beings just as they were, and drew and painted figures that looked more like dressed wooden dolls.

Later, the brush gave way to mosaic work—that is, the piecing together of little bits of colored glass or stone to form pictures. This form of art spread over the Western world from Byzantium, the capital of the Eastern Roman Empire, and is known as the Byzantine style.

For centuries artists continued to work in this manner, until, in the second half of the thirteenth century, in Italy, artists began to look at men and animals and all things in Nature, and to study their form

instead of merely imitating the stiff images of the earlier men. It was then that "modern" painting began, and the first great artist who tried to paint things as he saw them was a Florentine, called Cimabue, of whom we read on page 2788.

CIMABUE, WHO MADE A SHEPHERD BOY FAMOUS ALL OVER THE WORLD

Unfortunately, we are not quite sure whether any of the old pictures that have been preserved—mostly crucifixes and representations of the Virgin and the Infant Saviour—are from his hand. But we do know that he taught a very great master, who filled the walls of many Italian churches with his scriptural fresco paintings. Fresco is Italian for "fresh," and is applied to pictures done on a fresh, wet plaster ground.

This master's name was Giotto, and he was a humble shepherd youth. It is said that while out walking one day, Cimabue found him looking after his father's sheep and drawing one of the sheep on a stone. He was so struck with the boy's drawing that he took him away to his studio, and arranged with the lad's father to make an artist of him. "The Funeral of St. Francis" is a good example of Giotto's work.

Giotto died about ten years after Edward III. ascended the English throne. For quite a hundred years Italian painters continued to fill the churches of their country with pictures that resembled those of Giotto, but were not quite so good, simply because an imitation that does not introduce anything new is never as good as the original.

In the first year of the fifteenth century there was born in Florence another very great painter, who was called Masaccio, but whose proper name was Tommaso Guidi. He lived only twenty-seven years, but during this short life he raised the art of painting to a point which it had never reached before. There is no trace of stiffness or awkwardness in his figures, which have the grace and beauty of dignified human beings.

LEONARDO DA VINCI, THE PAINTER WHO TRIED TO FLY

The next generation of painters learned much of their art from Masaccio's frescoes in one of the Florentine churches, until, with Leonardo da Vinci, Raphael, and Michael Angelo, they achieved perfection. Leonardo, at the age of about eighteen, went to learn painting in the studio of Verrocchio, where he met other pupils who, like himself, afterwards became famous. These fellow-students were Botticelli and Perugino.

Leonardo very soon became a greater artist than his famous master. He was not only a painter, but a sculptor, a very learned man, a musician, an architect, an engineer, a mathematician; and he tried to invent a flying machine. But he lives in the world to-day, hundreds of years after his death, by his pictures. There is a very famous picture by him in the National Gallery, called "The Virgin of the Rocks"; but perhaps the best known is in the Louvre in Paris, and represents a smiling young woman called "Mona Lisa." Leonardo died in 1519, just a year before Raphael, who also made a name that is immortal. Raphael was only thirty-seven when he died, but in his short life he painted a large number of wonderfully fine pictures, which were original and faultlessly executed. It is for this reason that he has always been held up as a model for students, and people are willing to pay very high prices indeed for his pictures painted so long ago.

RAPHAEL, MICHAEL ANGELO, AND TITIAN, ITALY'S THREE IMMORTALS

In the Metropolitan Museum, in New York, may be seen Raphael's picture called "The Colonna Madonna," which was painted to hang over an altar. This famous picture was painted by Raphael when he was only twenty-two. It was presented to the museum by J. Pierpont Morgan.

Raphael was renowned for his paintings of Madonnas and of Christ when He was a baby. The Madonna, which is "My Lady," or "Our Lady" in Italian, was Christ's mother.

But there had been born, eight years before Raphael, an even greater artist, one of the greatest men who ever lived, called Michael Angelo. He was a famous sculptor as well as one of the world's painters. No artist ever wielded his brush with such marvelous power, nor did any painter ever execute, single-handed, so gigantic a work as the ceiling of the Sistine Chapel in the Vatican in Rome, where the Popes live. But it was in Venice, in Spain, and in Holland that the greatest masters of color were to work. In Florence the

painters had thought out their pictures as beautiful patterns of line-drawings, to which they afterwards added color in rather flat masses. The Venetians paid attention to color from the beginning, and studied the color appearance of things in Nature, and observed the effect of distance and different conditions of light. Their greatest master was Titian, who painted "The Garden of the Loves," which shows all his rich hues and the pleasure he took in the beautiful things of this world. He was also a very great portrait painter.

About the time that Leonardo and Raphael died, a young German painter named Hans Holbein began to make a name in Basle where he lived. Afterward he went to England, and painted many portraits which have taught us a great deal about the people who lived in those days. He died in London in 1543.

VELASQUEZ, THE SPANIARD, AND VAN DYCK, WHO PAINTED CHARLES STUART

One of the greatest masters of all time, named Velasquez, was born in 1599, at Seville, in Spain. His portraits are amongst the finest in the world. His picture of "Las Meniñas," the Maids of Honor, is really a number of portraits; we see the daughter of King Philip IV. of Spain—she is only five years old—dressed like a grown-up queen, with her little maids of honor, and in the mirror are reflected the king and queen, while Velasquez himself stands at his easel.

On the borders of Holland, too, another great painter had arisen, called Rubens, famous for his rich colors, which he had learned from the Venetian Titian. His most celebrated pupil was Van Dyck, who died the year after Rubens. Van Dyck lived in England for a long time as painter to King Charles I., by whom he was knighted. It was probably the example of Van Dyck that led to the birth of the English school of painting. One of the most charming of his pictures which have been brought over the ocean is a portrait, in the Metropolitan Museum, of the Earl of Arundel standing with his arm around the shoulders of his little boy.

REMBRANDT, WHO PAINTED THE PICTURES WITH THE GOLDEN LIGHT

At the same time that Velasquez and Rubens and Van Dyck were painting, there was living in Holland another of the great painters of all time, called Rembrandt, the golden painter, who made everything appear to melt from golden light into dark brown shadows. There are many pictures by him in the Metropolitan Museum, and among them, one of the finest of all, is a portrait of "A Man," wearing a large black hat, with a frill round his neck.

Older than Rembrandt, and living through his lifetime, was Franz Hals, a Fleming, who lived and worked in Holland. He was the greatest character portrait painter in the world. He was fond of a merry life and laughter, and he loved to paint jolly people, like "The Laughing Cavalier," so often reproduced.

Then in France there had grown up a number of artists, of whom Watteau is the most famous. He and his many imitators and followers, who never rivaled him in skill, painted lovely pictures, like scenes in fairyland. Watteau's "Embarkation for the Island of Cythera" is one of these beautiful pictures. Watteau died very young.

Then, in England, came Hogarth, who painted as if he saw people on the stage of a theatre, and who began the English style. He was a social satirist, besides being a very great portrait painter, as his picture of himself and his dog proves.

REYNOLDS WHO PAINTED PORTRAITS, AND TURNER WHO PAINTED THE SUN

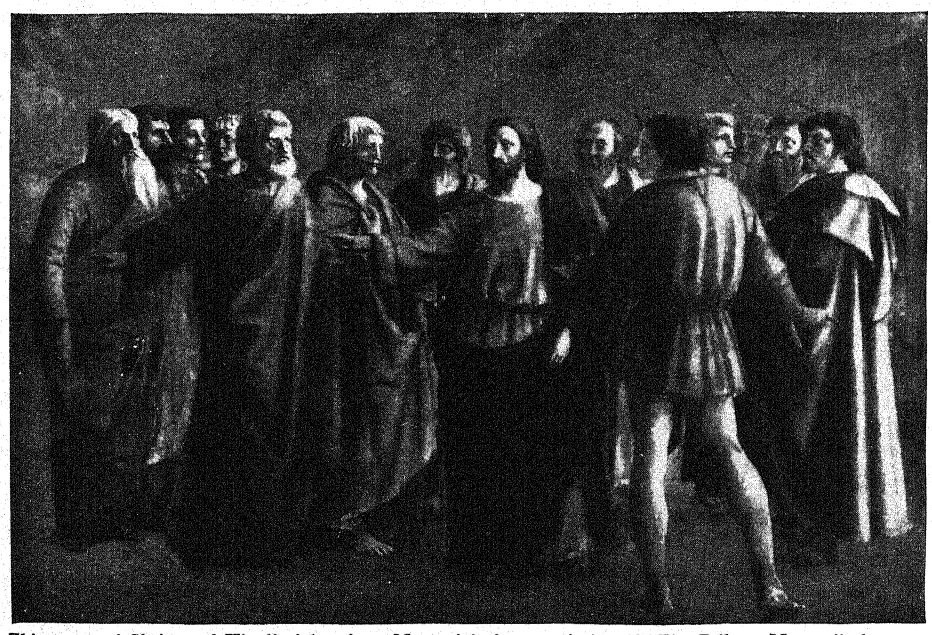
After Hogarth in England came Sir Joshua Reynolds, the first President of the Royal Academy, and Gainsborough, his great rival, who painted most of the celebrated people of England, when men wore powdered wigs and rode in sedan chairs. Reynolds' picture of a little girl, called "Innocence," and Gainsborough's picture of "The Blue Boy" are known to nearly everyone.

Then came a painter of landscapes, Constable, some of whose pictures we may see at the Metropolitan. And soon came Turner, one of the greatest landscape painters of the world, who painted the sun and the skies, the sea and the meadows, ships and harbors, castles and rivers with astounding beauty and poetic feeling. His famous and beautiful picture of Nelson's old battleship, "The Fighting Téméraire," is a very different picture from the funny old drawings made on reindeer bones by the men who lived in caves, long, long ago.

THE BEGINNING OF MODERN PAINTING



Giotto, who painted this picture of the death of St. Francis of Assisi, is called the first modern painter. He was the first great artist who painted objects and human figures so as to make us realize that they lived and had form. His drawing is considered faulty, the figures clumsy and heavy, and the perspective wrong; but he was the first to depart from the stiffness of the Byzantine artists towards freedom of composition and dramatic life and movement, apart from the formal beauty of harmoniously arranged line and color.



This group of Christ and His disciples, from Masaccio's fresco painting of "The Tribute Money," shows us another step forward in modern painting. Masaccio departed from the prevailing practice of arranging the figures in one row, in the manner of ancient reliefs, or one above another in diminishing size. His figures occupy their right places in the receding planes of the landscape, and live in their surrounding atmosphere. They are full of dignity and expression, while the folds of their draperies are worthy of the later masters.

MASTERPIECES OF FORM AND EXPRESSION



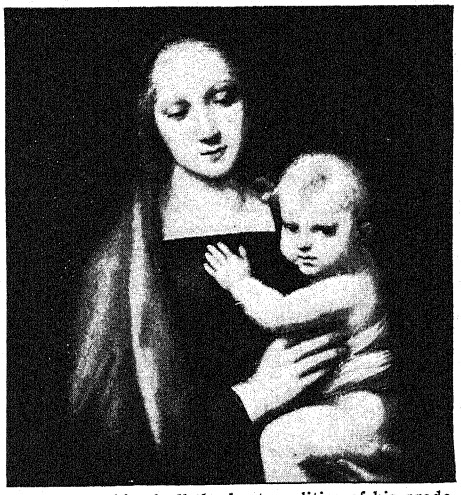
Botticelli's strength lay in the marvelously expressive use of decorative line as found in the art of Japan. His faces are very fascinating if scarcely beautiful.



This picture of "The Holy Family," by Michael Angelo, shows his powerful grasp of the human form, his vitality and grandeur of design and composition.



This fresco painting of Aurora, Goddess of the Dawn, by Guido Reni, is an essentially classical subject. It is Renaissance in style, though later in date, original in conception, graceful and full of life and movement.

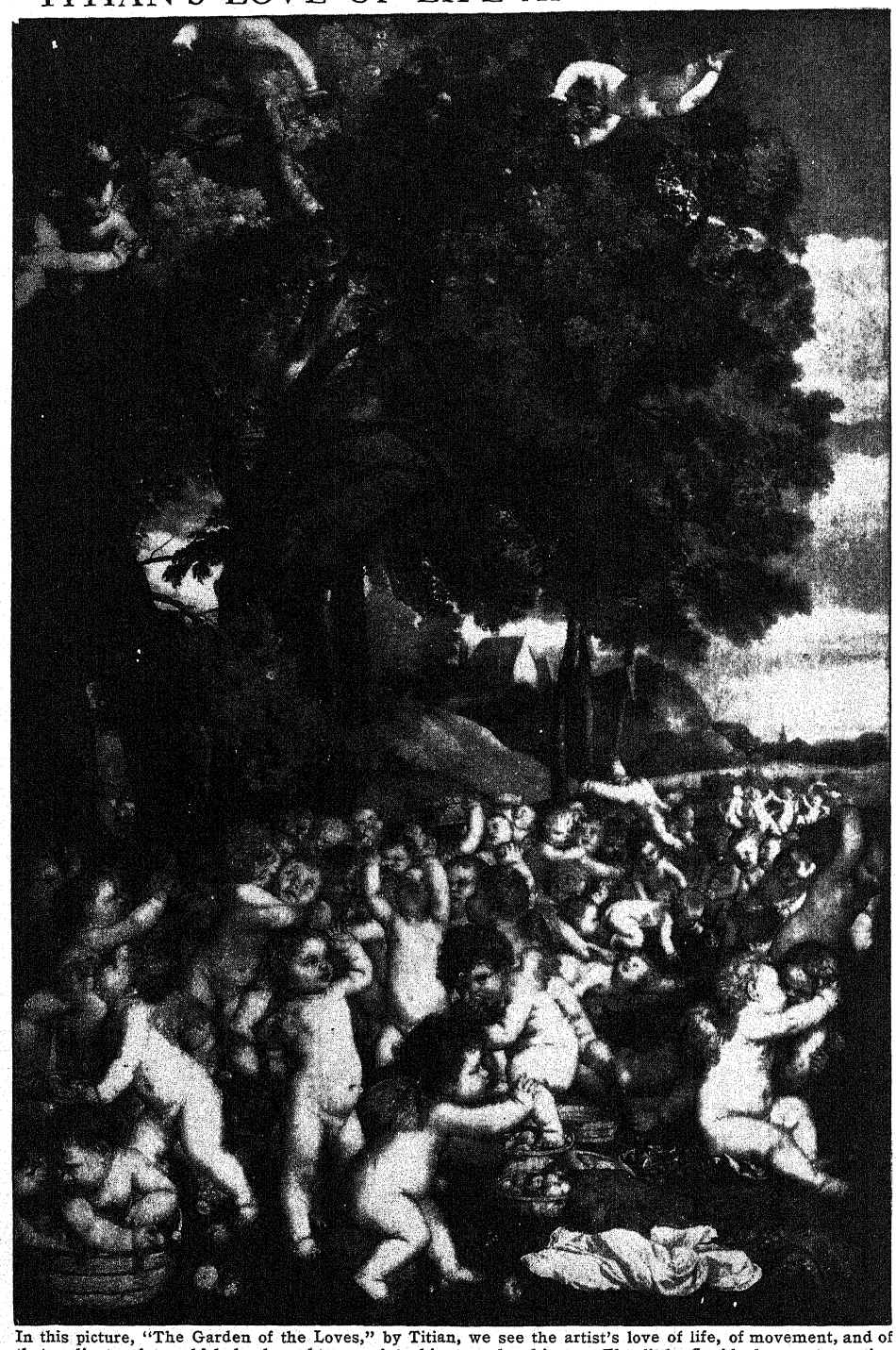


Raphael combined all the best qualities of his predecessors. This painting of the Madonna and Child is quite simple, yet beautiful and intense in expression.



Leonardo was a master of line and color, and painted emotion or serenity, strength or tenderness equally well. This is his celebrated picture, "Mona Lisa."

TITIAN'S LOVE OF LIFE AND MOVEMENT



In this picture, "The Garden of the Loves," by Titian, we see the artist's love of life, of movement, and of that radiant gaiety which he brought even into his sacred subjects. The little Cupids here are sporting joyously as they gather the apples culled from the rich trees above them. Titian was, perhaps, the greatest colorist the world has ever seen, and the marvelous glow of his color is only rivaled by the rhythm and great beauty of his composition. As a portrait painter Titian easily ranks with Velasquez and Rembrandt.

The pictures on these pages are from photographs by Alinari, Anderson, Neurdein, and Mansell.

PORTRAITS THAT WILL LIVE FOREVER



This portrait of Thomas Killigrew, by Van Dyck, reflects the artist's delicate and courtly nature. His somewhat aristocratic portraits are true renderings of the souls and personalities of his subjects. Van Dyck began the school of English portraiture.



This picture of "The Laughing Cavalier," by Frans Hals, is a triumph in bold, dashing, and daring brushwork, and brilliant characterization. Hals the realist has painted laughter in all its phases. He was the greatest portrait painter of Holland after Rembrandt.



Hogarth made English art healthy, robust, and popular. He was the moralist of art, painting the vices and follies of his age. This portrait of the artist and his dog, painted by himself, shows us not only his intelligent face, but also the style of his brushwork.



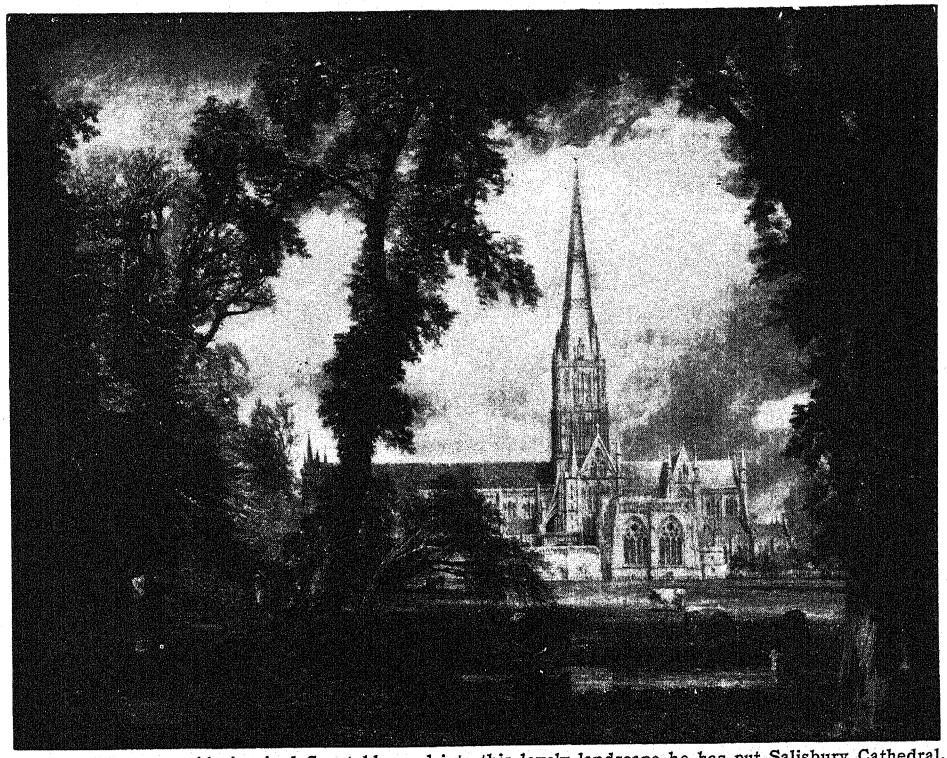
In Rembrandt's work there is no hardness of line, and everything is expressed in soft lights and shadows and in soft, golden half-shadows. With him, character and soul counted more than beauty, though there is, indeed, beauty in this picture of "An Old Woman."

THE GREATEST PAINTER OF CHILDREN



Reynolds is the king among painters of children. His children are children and not miniature men and women, as this portrait of little Miss Bowles and her dog shows. He preferred firmness and energy in his brushwork to the elegance of Gainsborough. His portraits are consequently more convincing than those of his rival, and yet they do not lack charm. The dog here seems to be longing to break from his captor's arms.

A SPARKLING LANDSCAPE & REAL PEOPLE

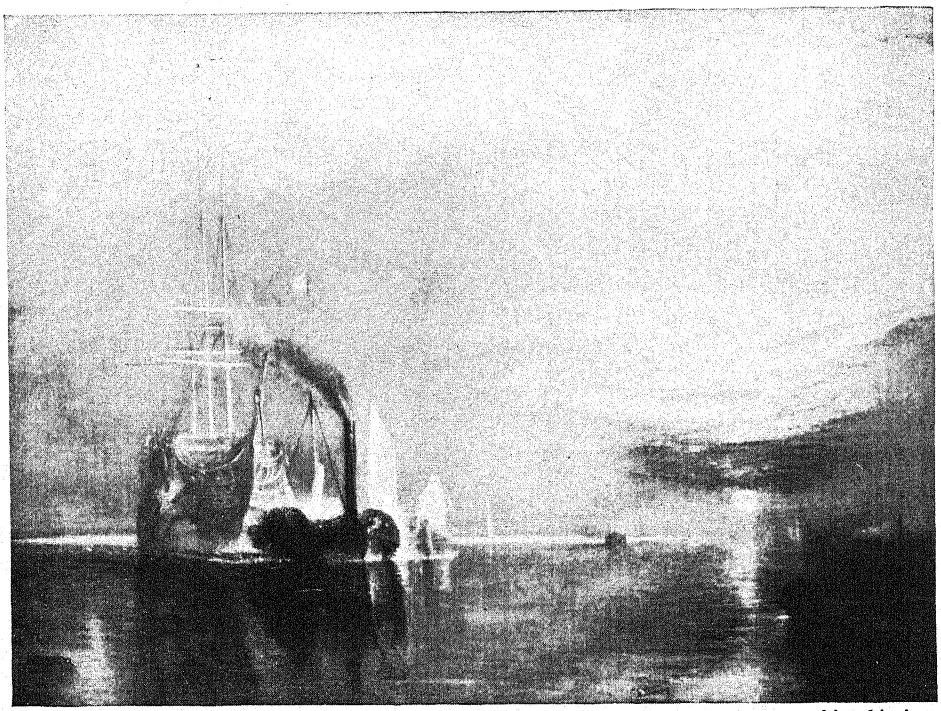


The English countryside inspired Constable, and into this lovely landscape he has put Salisbury Cathedral, often said to be England's most beautiful building. The cattle at the stream, the spire soaring into the piled-up clouds, and the arched frame of trembling, sparkling green leaves that is formed for the sunny meadows and the cathedral itself by the two fine elm-trees in the foreground, make a masterpiece of composition.



Velasquez, who stands on the left in this, his "Maids of Honor," was one of the greatest of the masters. Painting with sureness of touch, and using only four colors, he gives an amazing effect of reality, showing us just what we should see at one glance, the life of both body and soul being laid bare without apparent effort.

THE GLORY OF SUNLIGHT AND MIST



This picture of "The Fighting Téméraire," by Turner, shows us his greatest loves, the sea and its shipping, and the sunlight and its glorious effects on the transparent atmosphere. In Turner's best landscapes the objects and actual view are secondary. He was an idealist and a visionary who clothed the inventions of his imagination in real golden sunlight. Turner never forgot the wonderful atmospheric effects of Venice.



Watteau came near to Turner in his rendering of soft atmospheric effects, and he was very modern in his perfect balance of gaily appareled figures and fairy-hued landscape. He gave, too, a convincing air of reality to scenes which only had existence in his imagination, such as this typical picture, called "The Embarkation for the Isle of Cythera." The life he depicts is artificial, but there is nothing artificial in his style.

THE NEXT PICTURES OF FAMILIAR THINGS BEGIN ON PAGE 4697.



THE MAN WHO REFUSED A BRIBE

CONTINUED FROM 4578

IN the days when the Commonwealth had come to an end, and a king once more reigned in England, the fortunes of some of the bravest and wisest of the followers of Oliver Cromwell were at a low ebb. Milton, the poet, who had worked so hard for the Protector, was arrested and thrown into prison; and many others were harshly treated by the Royalists.

There was one faithful follower of Cromwell, however, who had a great influence under the new Government. He was Andrew Marvell, a poet and satirist, the Member of Parliament for Hull. He was returned to Charles II.'s first Parliament, and, though he seldom spoke, he was a most influential man. He bravely stood up and defended Milton, and acted so vigorously on Milton's behalf that he obtained Milton many friends.

It was Andrew Marvell's writings, however, that had most effect. They were called satires—that is, writings which bitterly ridicule the words, actions, or writings of another man. For instance, he was very indignant because Charles II. was always getting money from Parliament and wasting it. Andrew Marvell wrote a sham speech of the king on the state of his finances. Later on his writings became very bitter. He assailed the courtiers, and attacked Clarendon, the great minister, and finally he satirized Samuel Parker, the intolerant Bishop of Oxford.

Now, the king and his ministers felt that this clever writer must be silenced, and the following story is told of him:

The merry monarch, Charles II., was often delighted to meet and entertain Andrew Marvell, delighting in his ready wit and quick repartee. One morning the king sent the Lord Treasurer Danby to seek Marvell, who was a very poor man, and earned but little more than the small salary which the town of Hull paid him as its Member. The crafty king knew this, and he told Lord Danby to use every means to win over Marvell to his side. The king authorized him to offer the poet a place at Court and a generous gift of money.

The Lord Treasurer had some difficulty in finding Marvell's lodging, but at last he discovered the house and entered abruptly.

"To what do I owe the honor of this visit?" asked Marvell, looking up from his writing.

"I come with a message from his Majesty, who wishes to know what he can do to serve you," replied Danby.

"It is not in his Majesty's power to serve me," said Marvell.

"But his Majesty wishes you to accept a post of honor at the Court."

Andrew Marvell promptly refused to accept the honor, or rather dishonor, as he counted it, saying:

"I cannot accept any post with honor, for I must be either ungrateful to the king in voting against him, or false to my country in giving in to the measures of the Court. The only favor I beg of his Majesty is that he will esteem me as dutiful a subject as any he has, and that it is more in his interest for me to refuse than accept his honors."

Lord Danby tried to persuade him, but all in vain; Marvell remained firm.

Danby then produced a bag containing £1,000 ($5,000), and placed it on the table, as we see in the picture, saying:

"The king has ordered me to give you a thousand pounds, which he hopes you will accept until you can think of some further boon to ask of his Majesty."

Andrew Marvell began to laugh.

"Surely, my lord, you do not intend to mock me by these offers. I do not need the king's gold. I have shelter; and as for my food, you shall hear of that from my landlady."

"Pray," said he, turning to the latter, "what had I for dinner yesterday?"

"A shoulder of mutton."

"And what shall I have to-day?"

"The remainder hashed."

"And to-morrow, my Lord Danby, I shall have the sweet blade-bone broiled."

Danby, so the story runs, quite overcome by the stern simplicity of the famous writer, picked up his bag of gold and returned to the king.

THE BRAVERY OF BERNARD PALISSY

IN the early years of the sixteenth century, a young workman, with a wallet on his back, set out from a village in the south of France to seek his fortune. He was a glass-worker by trade, and by means of his skill managed to earn his bread as he went along. As for book learning, he knew nothing.

This young workman, whose name was Bernard Palissy, settled down at last in a town called Saintes, and earned fair wages as a glass-painter and land-surveyor. He married soon afterwards, and became the father of a family. It was anxiety for his children which made him consider whether he could not find some employment better paid and more regular than that of painting on glass.

He knew the fine pottery covered with white tin-enamel which was made in many parts of Italy. One day he saw, among the treasures of a nobleman, a lovely plate of Chinese pottery entirely different from the Italian ware. How very beautiful it is! Ah, if he could bake common earthenware and transform it into fairy beauty like this plate, how happy he would be and what a fortune he would make!

Bernard thought the matter over, dreamed of it. Of what was this enamel composed—how was it made? He pounded every substance he could think of as likely to produce it, smeared the result over common pots, placed these pots in great heat, and baked them—in vain! His wife called him hard names for wasting his time. But Bernard was bent on discovering how to make this enamel, and nothing could stop him. He built a furnace out of doors, and went on seeking his precious enamel.

Years passed—years of failure and defeat. The neighbors thought him mad. And no wonder. He went about with tattered clothes, gaunt as a spectre, ugly as a scarecrow; the calves of his legs disappeared, so that even garters could not keep up his stockings, which fell about his ankles. His furnaces were in the open air, and Bernard would sit watching them even when a tempest was raging overhead; and when the poor fellow, drenched by rain, finally took shelter in his cottage, it was only to receive a terrible scolding from his wife.

One day, just when success seemed to be crowning all his years of effort, the fuel for his furnace gave out. Bernard rushed at his garden fence-rails, tore them down, and burned them. Still the experiment tarried, and the palings were all consumed; he ran into his house, seized tables, chairs, and shelves, and flung them into the flames. On another occasion he invited his impatient creditors to witness his success, but when they arrived they found that part of the furnace walls had fallen and ruined the whole of his work, and so they jeered at him in his despair.

However, Bernard was a genius. After sixteen years of heart-breaking failures, this ragged, lonely-souled Rip

van Winkle, with the glow of the furnace lighting up his haggard, spectral features, cried out, "Eureka!" The secret of the enamel had been discovered. He had received no sympathy from his wife. He had fought on in a terrible loneliness of heart and soul. After those long years of failure and discouragement, at last he had found a way to make the pottery.

One of the little plates made by this workman—a little plate with a lizard in the centre—was recently sold for $800!

But Bernard was marked out for suffering, not for success. Soon after he had made his discovery, he was arrested for being a Protestant, and flung into prison. The mob broke into his place, smashed all his contrivances, and destroyed his furnaces. The judges sentenced him to be burned, but a nobleman who wanted Bernard's beautiful work had him released, and for some years the potter worked for the Queen of France in Paris. Here he was famous and wealthy; but when he was nearly eighty, the poor old man was again arrested for being a Protestant. The king himself came to see Bernard in prison, begging him to abjure his faith, and saying that so implacable were Bernard's enemies that if he did not turn Catholic the king would be *forced* to sacrifice him.

"Sire, I am prepared to give my life for God," answered the old potter. "Many times you have said you are sorry for me. Know now, sire, that I am sorry for you—you, who have uttered the words, *I am forced.* That is not spoken like a king, sire."

No one could force the sublime soul of this man to lie to God.

With perfect composure this grand old potter waited calmly for the scorching flames of the martyr's stake. But before the pyre was lit—neglected, broken, and deserted—he died in his prison cell after a year's living death in the Bastille.

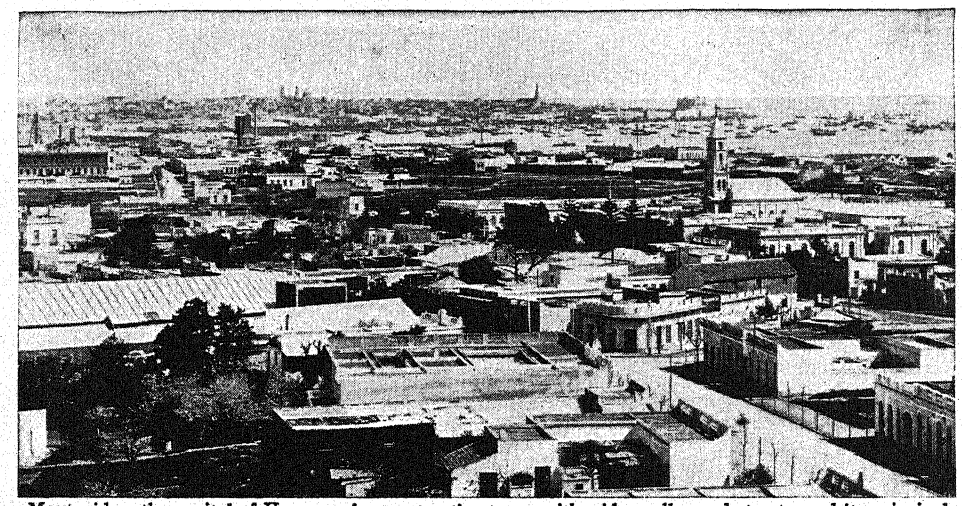
Is it not such a man as this who lights up for us the record of humanity, and who unites all classes of the community by his shining example of courage, determination, and unshakable righteousness? What a soul was that which mounted to God when the body of the potter sank breathless and cold on the floor of his lonely prison cell!



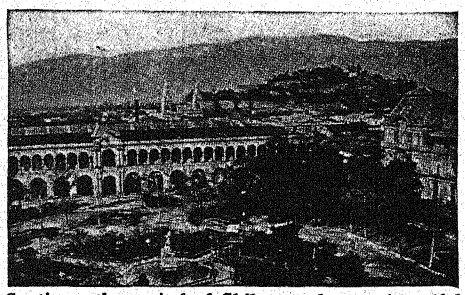
WHILE PALISSY GAZED UPON HIS RUINED WORK, HIS CREDITORS JEERED AT HIM

THE NEXT GOLDEN DEEDS ARE ON PAGE 4661.

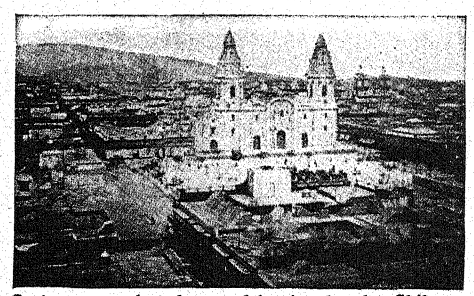
THE CITIES AND PORTS OF SOUTH AMERICA



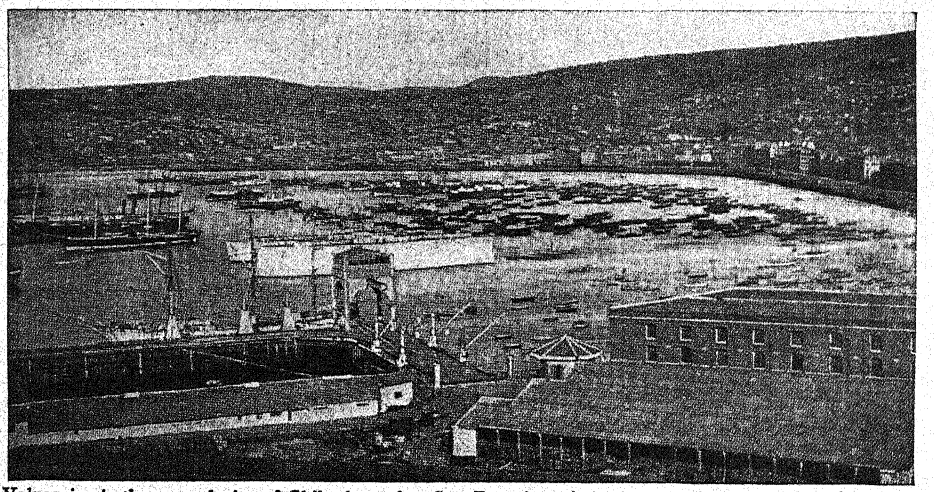
Montevideo, the capital of Uruguay, is an attractive town, with wide, well-paved streets, and its principal thoroughfare is recognized as one of the finest streets in South America. Had the city half a century ago made its harbor suitable for large vessels, it might have become one of the chief South American ports.



Santiago, the capital of Chile, stands on a beautiful plain, with the snow-capped Cordilleras, a branch of the Andes, looking down upon it. The city, which is 1,700 feet above the sea, is very important.



Owing to earthquakes, and looting by the Chileans during the last war, Lima, the capital of Peru, presents a very dilapidated appearance. Its cathedral, shown here, is the most imposing in South America.



Valparaiso is the second city of Chile, but, after San Francisco, it is the most important American port on the Pacific coast. Its name means Vale of Paradise. The city is built on a sloping plain, cut up by hilly ridges that are so steep in parts as to need staircases for travelers. The bay is, in winter, a dangerous anchorage. It is open to the sea, and in winter storms, ships are sometimes torn from their anchors.



A band of gauchos, the herdsmen of the great plains of Uruguay and Argentina, branding an ox.

THE REPUBLICS OF SOUTH AMERICA

PART I

CONTINUED FROM 4514



THREE small colonies in the north of South America were untouched by the wars of independence of which we may read elsewhere in the book. These colonies are French Guiana, Dutch Guiana and British Guiana, which still belong to France, Holland and to the British Empire.

The three colonies changed hands several times. Dutch Guiana, or Surinam, was first settled by the English, but in the reign of Charles II was ceded to the Dutch, while by the same treaty New York was ceded to the English. On the other hand British Guiana was first settled by the Dutch in the seventeenth and eighteenth centuries. The colonies were captured by the British more than once and were finally ceded to them at the close of the Napoleonic Wars. Since that time there have been boundary disputes, with Venezuela, which lies to the west, and Brazil, but the boundaries were settled by arbitration. A large proportion of the population is composed of East Indians and negroes. Of the white inhabitants much the larger number are Portuguese. There have been no striking events in the history of Dutch Guiana since it became a possession of Holland. The population is small and more than half its numbers is composed of native Indians. East Indians are employed on the rice and sugar plantations. Settlements were made in French Guiana or Cayenne in the year 1626, and with the exception of a few years during the Napoleonic Wars this colony has ever since remained in possession of the French.

THE STORY OF VENEZUELA SINCE THE REVOLUTION

To free themselves from Spanish rule, Venezuela and New Granada united to form the Republic of Colombia, which included Ecuador. Simon Bolivar, "the Liberator," was chosen as first president, and the city named for him was made the capital. In 1829 the union was broken at the desire of Venezuela, and Venezuela set out in her career alone. The first president, Jose Antonio Paez, was a strong man, who had made a name as a leader during the revolution. Whether he was in or out of office, Paez held the power, and generally kept the peace, for about twenty years. Since that time the government has been very unsettled. Too often the president has come into power on top of a revolt, and the longest period of peace has been between the years 1880 and 1892,

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when, like Paez, Guzman Blanco held the power whether he was president or not. In 1910, however, Juan Vincente Gomez was elected president. He was again elected in 1915, and at the time this story was written he was still in power and seeking to give his country the blessings of a settled rule.

As we have seen, the Spanish conquerors went to the country, not to settle, but in search of gold. The first colonists did not take their families with them, and those who settled in the country freely intermarried with the natives. This was done even by officials in the provinces. The Spanish and Portuguese have never held the scorn for people of mixed race that northern people have, and consequently intermarriages continued even after settlers commenced to bring their families to the country. This was especially the case in the hot regions of the north, where European women and children found it hard to live. As a result the greater part of the population is composed of a restless, childish race, descended from Spaniards and Indians or Spaniards and negroes. Many of the Venezuelans are of course of pure Spanish descent, but they are few in proportion to the numbers of the population.

Although by law education is compulsory, there are not nearly enough schools to enable the children to be taught. A large proportion of the population cannot even read or write and you can see how easily a clever man can stir these ignorant, excitable people to revolt against the government and place him in power.

Venezuela has had disputes about boundaries with Colombia and Great Britain. You may read in the story of the United States about the dispute with Great Britain, which was settled by arbitration. The dispute with Colombia was also arbitrated, but the boundary decided upon by the king of Spain, who was the arbitrator, has never been surveyed.

There are only a few hundred miles of railway in the country and roads may be said not to exist. Consequently trade and commerce cannot flourish. About half the country is covered by forest. Another large section consists of the llanos, or great plains in the central part of the country, which are watered chiefly by the Orinoco and its tributaries. The climate of course is very hot except in the high mountain valleys, where life is very pleasant and nearly all the crops of the temperate regions can be grown.

Immense tracts of Venezuela have never been explored. In some places tribes of independent Indians live under their own chiefs. Large numbers of these Indians know nothing of Christianity, and live almost as they did when they were first discovered by Europeans. Many of them, however, are very intelligent and if treated with wisdom they could be taught many of the ways of our civilization without losing what is best of their own characteristics.

THE PROVINCES THAT WERE LOST TO COLOMBIA

A great deal of what we have said about Venezuela might just as well be the story of Colombia. There is one great difference, however: revolutions have not often succeeded, and the presidents of the republic with two exceptions have been elected. When Spanish rule was first overthrown, Ecuador and Panama, as well as Venezuela, were joined to Colombia. Ecuador declared its independence about the same time as Venezuela, but Panama continued to be part of Colombia until 1903, when it broke away. There might have been a war between the two states then, but the sympathies of the United States were with Panama, and its influence was strong enough to keep peace. The story of the revolution, however, belongs to the story of Central America, and you may read it there.

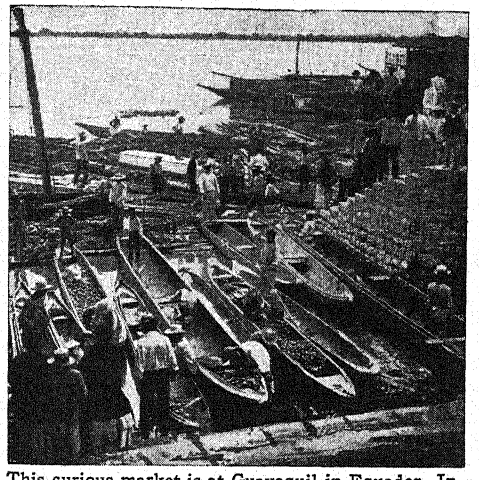
The mountains in both Colombia and Venezuela are rich in minerals. Although it has not been much worked, iron is found in both these states and there are valuable deposits of oil in Venezuela. Ecuador is famous for its emerald mines, and gold is still found in both countries.

The llanos, of which we have already told you, stretch from Venezuela into Colombia, almost to the foot of the Andes. Colombia is much more mountainous than Venezuela, and up in the mountain plateaus and valleys, there are large tracts of rich land. Bogota, the capital, is in the ancient Chibcha country, where, in spite of the fact that it is only a few degrees north of the equator, the climate is not extremely hot.

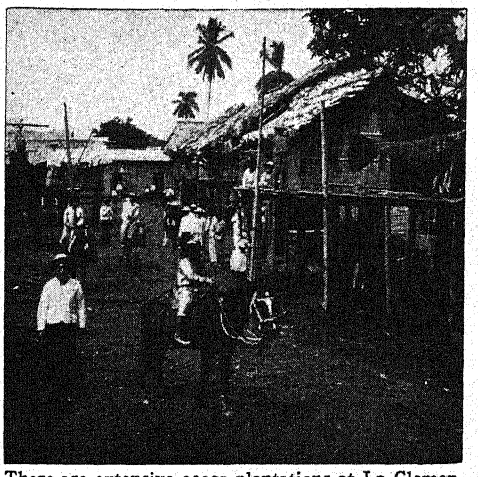
ECUADOR'S STORMY HISTORY OF REVOLUTIONS

Since the War of Independence, Ecuador has had the same history of revolution as every other South American re-

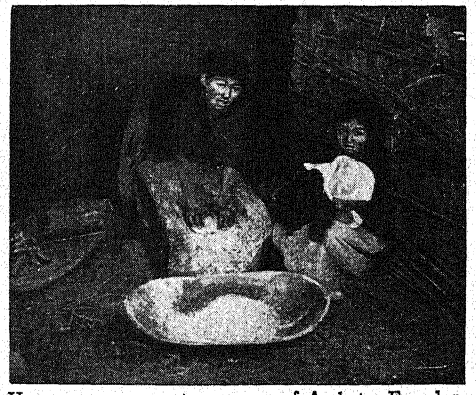
THE DAILY LIFE IN ECUADOR AND PERU



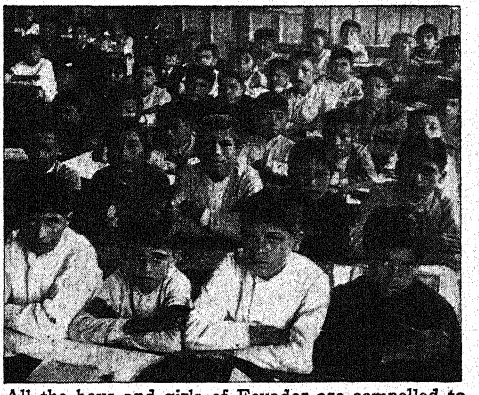
This curious market is at Guayaquil, in Equador. Instead of using stalls, the sellers arrange their goods in canoes, to which the purchasers go marketing.



There are extensive cocoa plantations at La Clementina, in Ecuador. The houses of the laborers are curiously built on long poles, like stilts, as shown here.



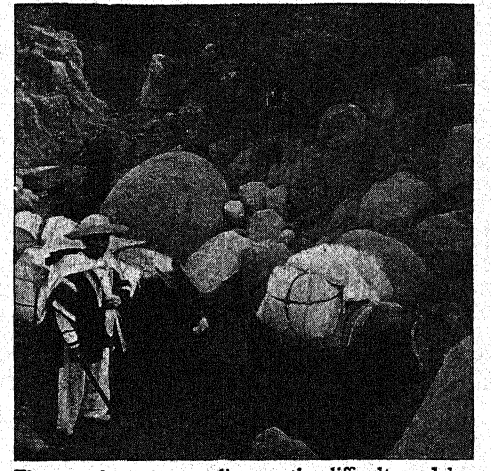
Here we see a country woman of Ambato, Ecuador, in her peasant home, grinding oats to make bread.



All the boys and girls of Ecuador are compelled to go to school; but, generally, education is poor.



In this picture we see a native market at Cerro de Pasco, in Peru, where blankets, ice-cream, and vegetables are being sold, a popular mixture of goods.



These natives are traveling on the difficult road between Ambato and Riobamba, in Ecuador. The road is a mere trail, and goods are carried up by mules.

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public. The people do not really understand the meaning of popular government. The president, as a rule, is a dictator, and holds power until another leader becomes strong enough to have himself elected by force.

A large part of the country is mountainous, and the most thickly populated regions are the plateaus of which the Incas had obtained possession. Quito, the capital, where you remember Atahuallpa held his court, is only a few miles away from the equator, but it is built so high up in the mountains that it has a temperate climate. A railway and a telegraph line run from the port of Guayaquil to Quito, and there are short lines of railway running inland from the ports of Bahia and Manta. The country, as you may see from the map, lies along the equator, and the climate of the lower valleys is very hot.

Navigable rivers run through the coastal plain and in this low country take the place of roads. For the most part, the roads through the mountains are only trails, and travel from one part of the country to another is very difficult. Indeed a great deal of Ecuador has never been explored.

Uncivilized Indians roam through the forests of the coast and the east. Indians form much the largest part of the population. It is estimated that there are about 400,000 mestizos, or people of Spanish and Indian descent, and about 100,000 white people, chiefly, of course, of Spanish descent, all of whom look down upon the Indians, and treat them as an inferior race. Yet the Indians are intelligent. You remember that the Indians of the mountain regions had their own civilization before the Conquest,—and if they were wisely treated many of them could be educated.

Education is compulsory, but although there are three universities there are only about 1,300 primary schools in the whole country. As in all the other republics, many of the people who can afford to do so send their children to Europe, or to the United States, to be educated.

BOLIVIA A MOUNTAINOUS INLAND STATE

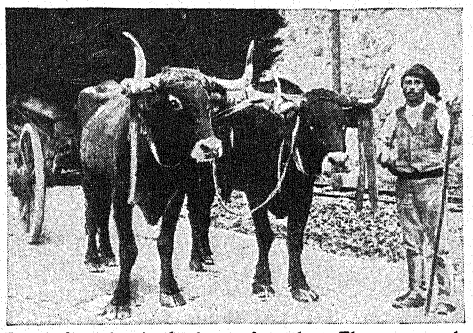
At the conclusion of the War of Independence, Upper Peru, which had been part of the Spanish province of La Plata, elected to separate from Argentina, and took the name Bolivia in honor of the Liberator. The people were no better prepared for independence than the people of the other republics, and scarcely had a president been chosen when bloody revolution followed after revolution with bewildering changes of government. Not content with fighting in their own country, the Bolivians interfered, in 1835, in a revolution in Peru. Chile then attacked Bolivia and there were some years of warfare between the three states.

The limits of the Spanish provinces had never been defined properly. The boundaries, therefore, which the republics inherited were very vague, and the want of a definite statement of the territory of each country has led to many disputes. Bolivia and Chile had such a dispute about forty years after they won independence. The question was settled then by a treaty by which the boundary line was defined and Chileans were given the right to mine nitrates in the desert of Atacama. Later on a dispute arose over a question of duty to be paid on the nitrates, and Chile seized one of the Bolivian ports. Bolivia declared war, and Peru, which had a treaty with Bolivia, was drawn in. The Chileans were victorious on land and sea. Peru, weakened by revolutions at home, made peace, and thus left alone, Bolivia, which was also weakened by revolution, had no alternative but to sign a treaty of peace dictated by Chile. By this war Bolivia lost all her coast line and is now an inland state. Some years later she had a boundary dispute with Brazil, which was settled by Brazil paying a large sum in exchange for part of the territory in dispute.

Since this century began the elections of presidents have been peaceful. The country is quieting down to a settled rule, and is becoming much more prosperous. Its wealth lies principally in minerals. Much silver and tin are exported, but since the independence of the country became a fact the gold mines have been little worked. The eastern provinces are rich and the forests produce large quantities of rubber. The crude rubber is made into balls which Indians make into rafts and thus float it down the River Madeira to the Amazon and thence to the sea.

Railways now run from Arica and Antofagasta on the Chilean coast to La Paz, the principal city of Bolivia. The roadways throughout the country are

A GREAT CATTLE-RANCH IN URUGUAY



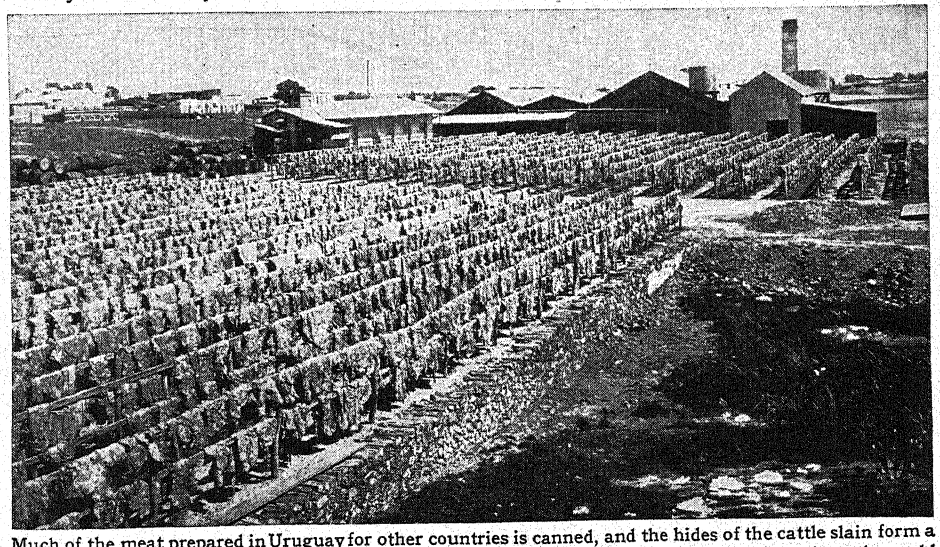
South America is the land of cattle. They are used to draw carts and carry burdens. Here we see a half-breed Indian and his cattle-team in Ecuador.



Here we see cattle used in place of pack-horses, These oxen are taking produce to the market at Bogota, the capital of the republic of Colombia.



The huge cattle-ranches in Uruguay form one of the important sources of Europe's meat supply. The cattle are kept on undulating plains, and the herdsmen ride on horseback. Cattle and sheep rearing is the principal industry of the country. There are more than sixteen million sheep and six million cattle in Uruguay.



Much of the meat prepared in Uruguay for other countries is canned, and the hides of the cattle slain form a valuable by-product of every meat-canning works. The hides are hung in the sun to dry, and are then sold to be made into leather. The growing demand for leather makes the hides of greater value than ever.

poor. Away from the railways horses and mules are used to carry travelers through the mountains, and natives, mules and llamas carry freight from place to place.

More than half the population is composed of native Indians and more than a quarter of mestizos, the mixed race. The other quarter is made up principally of white people. Education is free and compulsory by law; but as usual in South America, the schools are few and poor. The great mass of the Indians and large numbers of the mestizos cannot read or write.

The mountain Indians are descended from the tribes which were ruled by the Incas; but centuries of oppression have made them stupidly obstinate and the great majority of them are very poor. Many of them still live in village communities such as existed in Inca times, which shows that this is the type of government which is best suited to them.

Military service is compulsory and advantage is now taken of their presence in the army to teach some of the Indians to read and write. Efforts are also being made to establish schools to teach young Indians better ways of agriculture, for these people still use the implements that were in use in Inca times.

PERU A LAND OF MYSTERIOUS RUINS

Peru is a land of great ruins. When the Spaniards conquered Cuzco and the plateau of Titicaca they found there ruins of forts, cities and temples built of enormous stones. The Incas had a faint tradition that long, long ago their ancestors, the children of the sun, had built these temples and cities. That is all we know about them. The stones used in their construction are immense. The engineering skill and the mason work of the builders were wonderful. No mortar was used to hold the stones together, and yet the walls have stood for untold centuries and it is impossible to-day to insert the thinnest knife-blade between their joints.

The greatest mystery of all is that at the time these buildings were erected the plateau of Titicaca must have been thickly populated, yet in its present state it will support only a very sparse population. Oca, which is a root something like a potato, grows there, and so does a small grain; but maize will not ripen, nor will any of the cereals introduced by Europeans. How then did a large population live? No one knows; but some students suppose that the mountains may have risen to their present height after the megalithic, or great stone, people had finished their work. Lake Titicaca is 13,861 feet above the sea and is the highest lake in all the world. The boundary line between Peru and Bolivia runs through this lake.

Peru was the last of the Spanish provinces to obtain independence. Whether the majority of the people wished it or not they had no opportunity to throw off the yoke, for the country was the centre of Spanish power, and freedom had to be brought to them from without. It was plain, of course, that as long as the Spaniards had a foothold in the country they would make efforts to regain the territory they had lost. Therefore, San Martin, the Argentine leader, and the navy of Chile under Lord Cochrane, an English officer, invaded Peru. The army of Colombia under Simon Bolivar, also gave help, the Spanish viceroy was driven out, and Peru became independent.

Independence did not bring peace. A war with Colombia was followed by the usual period of revolutions, and one revolutionary general after another made himself president, or rather military dictator. One of these was a descendant of the Incas, named Santa Cruz, who sought to make the country prosperous, and endeavored to unite Bolivia and Peru into something like the empire of his forefathers.

On the whole, however, the government of Peru has been much more peaceful than that of the other countries of which we have told you. From 1845 to 1879 was practically a period of peace. In the early part of this period the country prospered, but later too much money was spent on public works, and the government became almost bankrupt, in spite of large sums of money made from the deposits of guano and nitrate in the coastal desert and on the islands. These valuable deposits led to the disastrous war with Chile of which we have spoken in the story of Chile. During the war, the fleet which Peru had been building up was destroyed, the Peruvian armies were defeated, and Lima, the capital, with Callao, its port, were occupied by the Chileans. When peace was made in 1883 Chile was able to keep possession of the nitrate coast

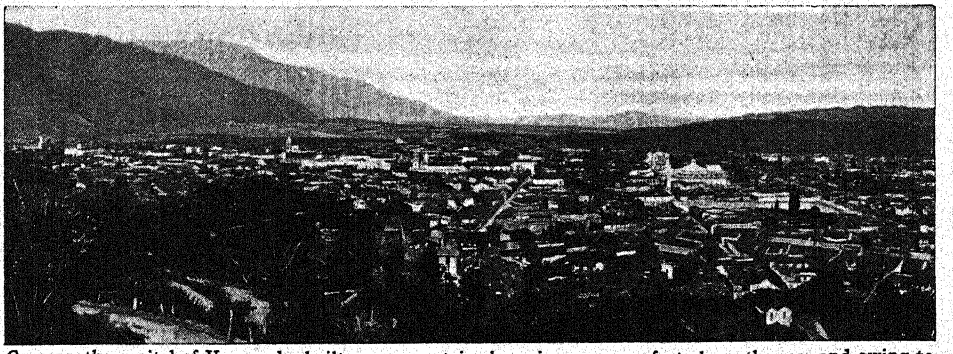
SOME SOUTH AMERICAN CAPITALS



As a seaport, Buenos Ayres had many disadvantages, the principal being the fact that, though the River La Plata is here 28 miles across, it was so shallow that, until the new docks were built, moderate-sized vessels had to anchor miles from the shore. Here we see a city street, with the docks in the distance.



The harbor of Rio de Janeiro, the capital of Brazil, is the finest on the Atlantic. The bay is three-quarters of a mile wide at the entrance, and widens to fifteen miles at its head, providing fifty miles of anchorage.



Caracas, the capital of Venezuela, built on a mountain slope, is over 3,000 feet above the sea, and owing to its height it enjoys a healthy atmosphere. The city has some fine streets and parks, and a number of handsome buildings. The district, however, is subject to earthquakes, one of which occurred in 1812, causing 12,000 deaths. Much of the western part of South America is subject to severe earthquakes.

of Peru as well as the coast provinces which she had taken from Bolivia.

Since the country settled down after the war, there have been peaceful periods, broken now and then by revolutions. Some of the presidents have been quietly elected, others have succeeded by means of civil war. Nevertheless the country has prospered, and progress has been made in industry and commerce.

The coast of Peru lies in the dry belt. Much of it is desert, but the high plain is broken by many fertile valleys, in which corn and sugar-cane are grown. Most of the people of the country, however, live in the high cool valleys between the mountain ranges, where the ancient inhabitants built aqueducts and made terraced fields and gardens on the steep mountain-sides. On the eastern sides of the mountains Peru owns rich forest land, and part of the great central plain.

More than half the people of Peru are Indians, and more than a fourth a mixed race, so that you see less than a fourth are of pure European descent. There are a few negroes, but not many. Many of the Indians tend their flocks of llamas high up on the mountain-sides.

There are a number of railways in the country. You can go by train from the coast to Lake Titicaca, and sail down the lake in a steamboat, while from its decks you watch the Indians sail along the shores in their reed boats called balsas. Another branch of the same railway will bring you to the great copper mines or to Cuzco, the ancient Inca capital. There are other railways, but none across the mountains, and the eastern commerce reaches the Atlantic down the great Amazon waterway. All the rubber from the lowland forests comes to us in this way. Ocean-going steamboats sail up the Amazon to Iquito, and smaller boats go a long way up the rivers into the mountain valleys.

URUGUAY HAS BECOME A PROSPEROUS COUNTRY

The story of Uruguay is bound closely to the story of Brazil and Argentina, as each of these great republics sought to make the little state part of its territory. At one time Brazil succeeded in conquering Uruguay; but in a few years the Uruguayans regained their independence. Then followed a period of civil war between parties called " the reds " and " the whites," and for nearly half a century the country was kept in a state of distraction by the rival parties. In the last years of the nineteenth century, however, a period of orderly government began, and in spite of one or two efforts at revolution the country is becoming a prosperous modern state. Like all the other states of which we have been telling you, education in Uruguay is compulsory, but there are not enough schools.

The gauchos, who compose a large part of the population, are of mixed Spanish and Indian descent. The Indian tribes were practically exterminated in a war in which they sought to drive out the Spanish invaders. There has been a good deal of immigration into the state, chiefly from Italy, Brazil and Argentina.

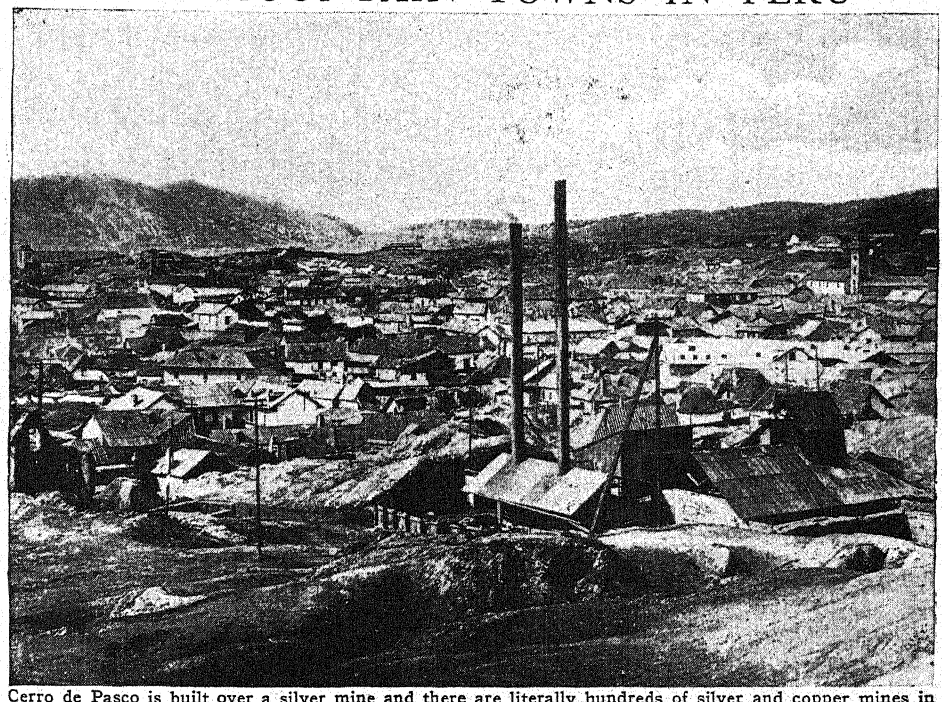
PARAGUAY, THE INDIAN REPUBLIC

The story of Paraguay is a tragic one. The population is almost entirely composed of Indians of the Guarani tribes, who when the Spanish entered the country had already learned the simple forms of cultivation. They were a peaceable people and easily conquered by the Spanish, and as we told you in the first story of South America, many thousands lived at one time in Jesuit missions. After the country became independent these simple Indians were easily dominated by the white inhabitants and for about fifty years the land was ruled by dictators. The first of these, José Francia, who ruled for nearly thirty years, literally turned the country into a " hermit land." None of the inhabitants were permitted to leave. No foreigners were allowed to enter. It is said that this policy was in a sense a good one, since it forced the people to rely upon themselves and to learn to supply their own needs.

He was succeeded by Carlos Antonio Lopez, who changed Francia's plans, tried to establish commerce and began to build railways. Under his rule the country began to gain in prosperity. He was succeeded in power by his son, whose mind was filled with wild ambitions. In an endeavor to carry them out, he began a war with Brazil, Argentina and Uruguay, which ended only with his death. When it was over, out of over a million and a quarter people, less than a quarter of a million were left. The war came to a close in 1870, and since that time peace has been broken only once.

THE NEXT STORY OF COUNTRIES IS ON PAGE 4841.

TWO MOUNTAIN TOWNS IN PERU

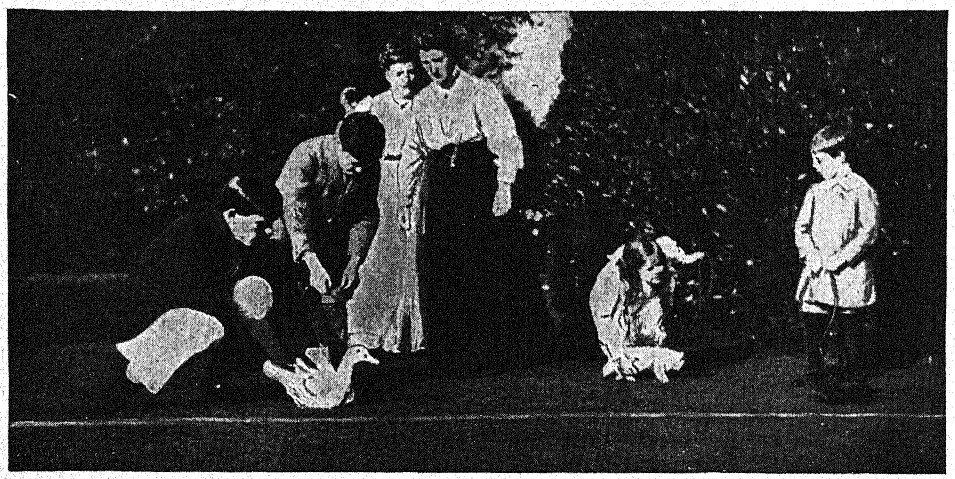


Cerro de Pasco is built over a silver mine and there are literally hundreds of silver and copper mines in the mountains around it. The city is built up in the mountains, 14,000 feet above the sea. In spite of the riches by which it is surrounded, it is, like most mining towns, very ugly. Most of the mines are owned by Americans. Many of the mine officials find it difficult at first to live in the thin air of this region.



This is the market-place in the mountain town of Tarma, not far from Cerro de Pasco. The men and women who are showing their wares on the ground are Indians and Cholos, as the Peruvians call the mixed race descended from Spaniards and Indians. Such a scene as this is common in all the towns and cities in Peru. The ancestors of these people tilled the irrigated valley fields and terraced mountain-sides long before the Spaniards came.

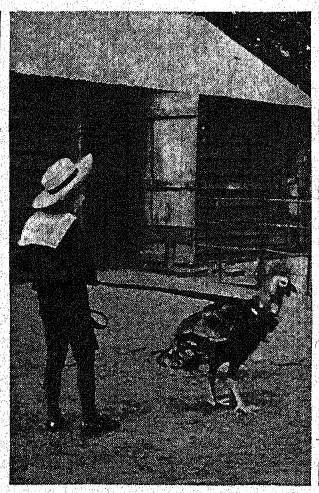
A MENAGERIE RACE IN A GARDEN



One of the best methods of brightening up a dull afternoon is to hold a menagerie race. First of all we must collect the animals, such as cats, dogs, rabbits, or fowls, that are to take part in the race, and harness them with string, as shown here, so that we can drive them. There need be no cruelty of any kind.



As a rule, the animals will go anywhere but in the right direction, which causes much merriment.



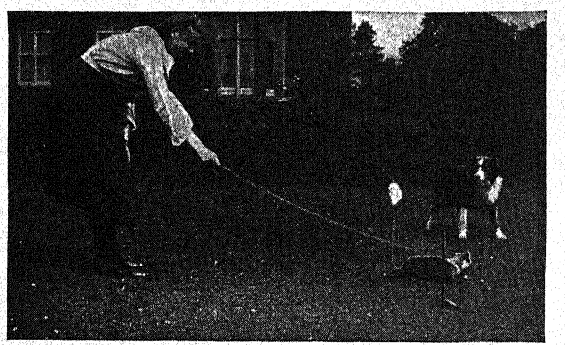
This turkey evidently felt hungry after the race began, for it strutted into the yard in search of food.



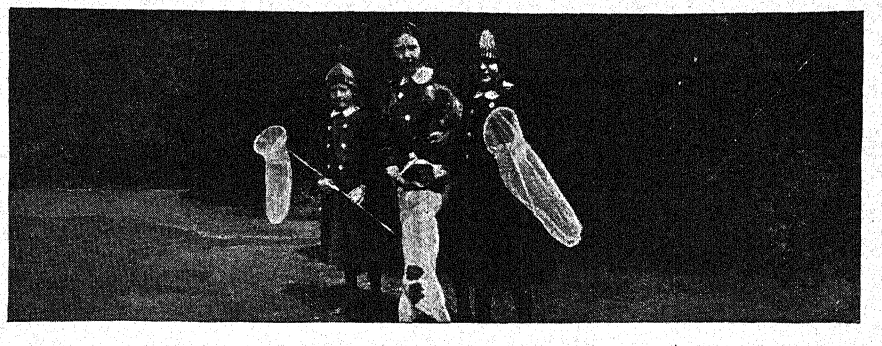
A young puppy is not very easy to manage, as we shall soon find out if we drive one in the race.



Instead of making for the winning-goal, this goose is steering straight for a pond.



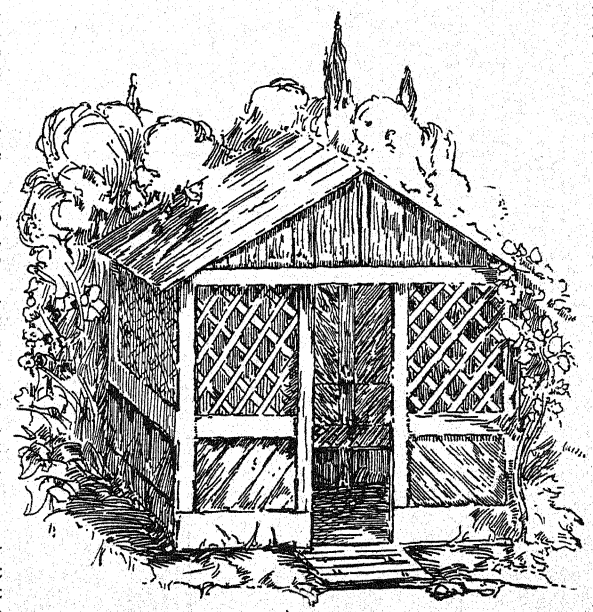
The race is not always to the swift, as we see by this picture, which shows a fox cub creeping past the winning-goal first.



MAKING A SUMMER-HOUSE

CONTINUED FROM 4500

A GARDEN summer-house may seem to be far beyond the skill of the boy carpenter, but it is not difficult at all. Size does not mean difficulty. Indeed, the garden summer-house, which we shall see how to make in this article, is really much simpler to construct than many of the things that are smaller. It will be suitable for any situation, but if it is to be placed in a corner or against a wall, the sides that face the wall or walls need not be finished so carefully as the front and those sides that will be exposed to view. We require, first of all, seven wooden posts eight feet long and three inches square. We first of all chamfer two edges of each post from top to bottom. By chamfering is meant to cut or shave off a corner. Picture 1 on the next page shows a small piece of wood that has been marked for chamfering. The shaded corners show the wood that must be cut away, and to the right of it, in picture 2, we see how the post will look when chamfered, if viewed from the top or from the end. We chamfer the four corner posts on three edges and the others on two edges only. The chamfered edges serve no purpose except to improve the appearance. The next thing we do with our posts is to cut away one end of each to a point, as in picture 3. The easiest way to do this is to make a pencil-line on all four sides of the post about four inches from the bottom. Then on each side we draw with a pencil two lines from the end of the pencil-line to a point right at the end of the post and midway in its width, as seen in picture 3. Now we take our saw—a cross-cut saw is best—and saw right through from the sloping line on one side to the corresponding mark on the opposite side. We should begin the sawing from the side of the post, not from the bottom. When we have sawn four pieces from the post in this way, it will be pointed as seen in picture 4. All the posts should be treated in this way, after which they are ready to be driven into the ground.

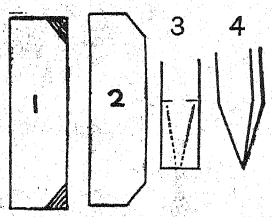


The garden summer-house when completed.

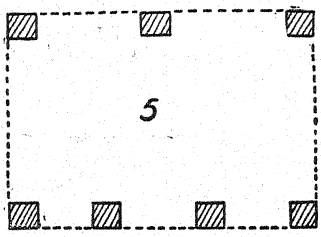
The ground upon which our summer-house is going to stand should be level. If it is not level, we should make it level with a spade. Now we measure off the distances so as to find the points where our posts should be driven in. We drive in three posts for the back

and four for the front. Picture 5 shows the distances between the posts, and therefore the distances that should be measured off. We can see the way in which the seven posts have to be arranged. The single post in the middle of the back is to give additional strength, and the two middle posts in the front will do for door-posts.

To drive in the posts, one boy holds a post with its point on the ground at the proper spot, and another boy, on the top of a step-ladder or a big box placed for the purpose, strikes the top with a heavy coal-hammer. As it is desirable not to injure the post that is driven in, it may be well to hold another piece of wood on the top of the post being struck, so that it may receive the force of the blow. The posts should be driven into the ground about two feet, and it is important that they should all be the same height. We can see if the tops of the posts are level by putting a plank across from one to another and testing it with a spirit-level. We can tell if the posts are upright by tying a small weight to a piece of string and allowing it to hang down from one edge of the side of the posts. If the lines made by the string and the side of the post are parallel, we know the post has been driven in straight, and we may then proceed with the next part of the work. Picture 6 on this page shows this frame at a later stage in the work. Here we have some boards about eight inches wide nailed along the bottom and along the top, and we have also horizontal ribs put in about midway in the height between the upright posts. The top and bottom boards are easily put in. It may require a little care at fitting the ends, but any boy will be able to find the proper way to do it as he proceeds. But the horizontal stays require some explanation. They should be made of the same size of wood as the posts, three inches square, and the two front edges should be chamfered like the posts. Then both ends of each horizontal stay should be cut in the manner shown in picture 7. This is called checking. The thin piece sticking out at each end is nailed to the upright post. An even stronger way of making these horizontal pieces is to cut them to a bevel, as illustrated in picture 8, and to cut out the upright posts to fit this bevel, thereafter putting two nails in from the back of the stay. This gives a little more work, but it is much the stronger method, and there will not be so much difficulty in fitting the ends of the stays where one stay touches another, so we should adopt this method.

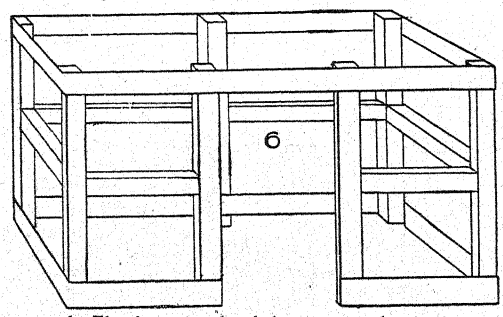


1 and 2. A board marked and cut. 3 and 4. A post marked and pointed.

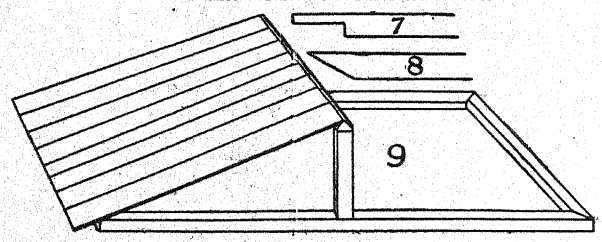


5. How the post should be placed.

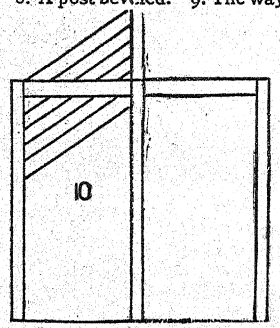
Our summer-house is still without a roof. We shall give it a roof of some ornamental form. We take four posts three inches square and cut them to the same length as the back and front and sides of our house. Then we must lay these pieces on the top of the upright posts and nail them, taking care to unite them carefully at the corners. Then we take a similar piece of wood and fix its bottom end to the middle of the top rail in front, and another piece to the middle of the top rail at the back. These two pieces should be of equal length, anything from twelve to eighteen inches. To the top of these again we nail a three-cornered piece right across from front to back. The skeleton of the roof as we have described it is seen in picture 9. Now let us nail on flat boards from the top, or apex, of the roof to the sides, allowing them to project at each side about six inches. Now we nail flat boards up the back, inside the summer-house, putting them on slanting, as seen in picture 10, and enclosing the back entirely. We treat the lower portion of each side and the front, excepting the doorway, in the same way, but we may put a slight chamfer on each board, all of which should be the same width, thereby giving a very pleasing effect. The upper half may be fitted



6. The framework of the summer-house.



7. A post checked. 8. A post beveled. 9. The way to make the roof.



10. Boarding back of the house.

with trellis-work, as in the picture on page 4613. Now we can paint the whole woodwork a soft green color, giving it no fewer than two coats of paint, and three for preference. The roof should be covered with light roofing felt, which can be purchased at any large hardware shop, and which should finally be given a coat of tar and sprinkled over with sand.

Our summer-house is now without seat or floor. We shall remedy these omissions. The earth floor should be beaten down hard and level. The best thing to do then is to make two wooden mats which, together, cover the entire floor. Three shorter posts should be driven in to carry the seat, then a front and back rail should be nailed on, and, finally, the slots for the seat will make it complete. If we like we can fill in the openings or window-spaces with trellis-work, which may also be painted green. We shall then have a strong, serviceable, and artistic summer-house. The inside of the summer-house may be varnished, and the inside of the roof will look well if painted in stone-color. A rustic table and white tablecloth may be added to complete the comfort of the summer-house, and curtains and ferns will help to decorate the interior, while the floor may be covered with linoleum.

If we can, we should dig a shallow trench round the walls, just a few inches clear of the posts. This will prevent the floor from becoming flooded in very wet weather.

PUZZLES WITH PAPER AND SCISSORS

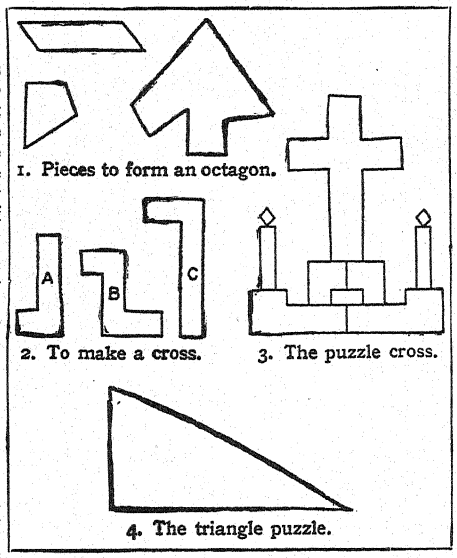
THERE are many curious ways in which boards or cards of one shape may be cut up into a comparatively small number of pieces, and the pieces rearranged so as to form an entirely different shape.

For instance, a carpenter had to mend a hole in a cupboard door, the hole measuring six feet by one foot, and all the wood he had for the purpose was one piece measuring four feet by eighteen inches. His employer told him that this piece could be cut into two pieces and put together so as to exactly fill the space without any overlapping. The carpenter was greatly puzzled at first, but after measuring the wood, and carefully considering, he took his saw and sawed it into two pieces which, when put together, filled the hole exactly. How did he divide the wood? We should cut out of paper the shape of the piece of wood the carpenter had, counting inches for feet, and see if we can do with it what he did.

Another carpenter was given a plank of wood measuring fifteen feet long by three feet wide, and with this he was told to put down a floor in a cupboard which was exactly square, but he was on no account to cut the plank into more than five pieces, four of which were to be equal in size. He thought for a few minutes and then cut the plank as instructed, and the five pieces of wood exactly covered the square cupboard floor. Let us cut out a piece of paper like the plank, reckoning inches for feet, and see if we can cut it as the carpenter did, into five pieces that will form an exact square.

There are many other puzzles of this kind that will afford a great deal of amusement and will exercise our skill and ingenuity. If we take a sheet of paper and cut out from it four of each of the three shapes given in picture 1, we can fit these twelve pieces together so as to form an octagon, or eight-sided figure. We can easily trace the shapes from this page, and then cut them out of stiff paper or cardboard as suggested.

Another interesting puzzle of this kind is to cut out eight squares, then to take four of them and divide each of these into two equal triangles by cutting across from corner to corner. We now have four squares and eight triangles—twelve pieces in all. Now let us fit these pieces together so as to form a perfect square. It is very easy to do when you know the way, but it requires thought and skill.



1. Pieces to form an octagon.

2. To make a cross.

3. The puzzle cross.

4. The triangle puzzle.

Here is another puzzle of a similar kind. Cut out three pieces of rather stiff paper of the shape of A in picture 2, and one piece each of B and C. Now put these together to form a cross.

Still more ingenious is this puzzle. The cross with candles in picture 3 is made up of nine pieces, as can be seen. Take a piece of paper, oblong in shape, say, four inches by two and a half inches in size, and fold it in such a way that with one cut of the scissors you divide the sheet into the nine pieces that will form a cross and candles like those shown in the picture. It can be done quite easily.

Another interesting puzzle is to cut out in paper or card twenty triangles, the shape of that in picture 4, and to arrange the twenty triangles so that they shall form a square.

Some curious results may be obtained by drawing triangles. Here is an example. Cut out of a piece of paper an equilateral triangle, that is, a triangle that has all its sides equal. Now let us draw upon the triangle thirty straight lines in such a way that we make the greatest possible number of triangles. What is the largest number that we can make?

The solutions to all these very interesting puzzles will be found upon page 4713.

MANY WAYS OF STOPPING BLEEDING

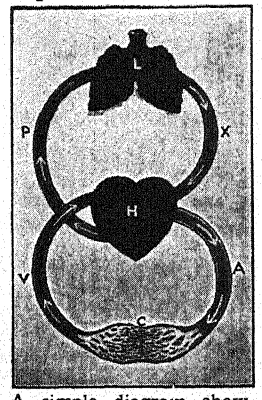
A FIFTH LESSON IN FIRST AID TO THE INJURED

CONTINUED FROM 4383.

QUITE a common form of accident is that in which some blood-vessel is injured, and the blood begins to leave the body. Sometimes the wound may be caused by the end of a fractured bone piercing the blood-vessel; at other times it may be caused by a knife or a piece of broken glass, or some similar object with a sharp point or edge; but, however the wound may have been caused, it is essential that the bleeding be stopped at once, and so first aid is particularly valuable in injuries of this kind.

The proper name for bleeding is hæmorrhage, which is made up of two Greek words meaning *blood* and *to break*, so that hæmorrhage really means bleeding through the breaking of a blood-vessel. Hæmorrhage may be either arterial, venous or capillary.

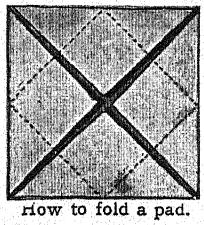
Before learning how to stop bleeding we must again examine the picture, which we studied in an earlier lesson, showing the main arteries of the body and the spots where, in case of injury, we apply pressure in order to stop the bleeding.



A simple diagram showing how the blood moves in the arteries and veins.

When we injure ourselves and blood comes from the wound, this blood is sometimes bright scarlet in color, and at other times it will be a dark red. Then the blood may spurt out of the wound, or it may ooze out, or it may slowly trickle. It is the color of the blood, together with the manner in which it comes out, that enables us to know where the blood comes from—whether from an artery, or a vein, or a capillary. This knowledge is very important.

First of all, we must know how to recognize arterial bleeding. It is the most serious kind of bleeding, and when one of the larger and more important arteries is injured it is very dangerous. Many a man who has received an injury to a large artery has had his life saved by first aid skilfully given.



How to fold a pad.

In arterial bleeding the blood is bright scarlet, and spurts out in jets, this spurting being caused by the pumping action of the heart. At each pump of the heart a jet of blood is spurted out.

In bleeding from a vein, which is called venous hæmorrhage, the blood is dark red and flows in a slow, steady, trickling stream.

Capillary hæmorrhage is the least serious of all, and usually occurs when we have a slight cut or graze. The blood is red, and oozes from the wound, and it soon stops flowing because the blood clots and stops up the cut. If it does not stop of its own accord, we can make a small fold of lint or clean linen rag, and tie this upon the wound. The pressure usually stops the bleeding in a few seconds.

To stop arterial and venous bleeding different methods are used, but there are one or two general principles that must always be considered.

First of all, we should remember that all bleeding can be stopped for the time being by pressure with the fingers, and therefore the first thing to do in a case of injury is to use pressure, even before we consider whether the bleeding is arterial, or venous, or capillary. Then, in the second place, let us remember that blood, like water, never runs uphill unless it is forced to do so. Therefore, the injured limb should be slightly raised or the patient should be so arranged that the blood is not allowed to run down and out of the wound. All tight-fitting garments, such as collars and garters, which would hinder the free return of blood to the heart, should be removed at once. Before learning how to stop bleeding from arteries and wounds we must remind ourselves of the direction in which the blood flows through these vessels. As we know, in the arteries the blood is always passing away from the heart, while in the veins it is passing towards the heart. If we think for a moment, we shall see that the point at which we press to stop bleeding will be different in the case of arteries from what it is in the case of veins, simply because the blood is passing in different directions in the different kinds of blood-vessels. The simple diagram on this page will show how the blood circulates in our body. The pure blood, bright red in color, is pumped from the lower part of the left side of the heart, H, through the arteries, A, into the capillaries, C. From these it passes into the veins, V, having now become impure and dark in color. The veins carry the blood back to the upper right-hand side of the heart, from which it passes to the lower part of the right side, and is then pumped through an artery, P, called the pulmonary artery, which means simply the lung artery, and is carried to the lungs, L. There the blood is purified, and is carried back to the upper left-hand side of the heart by the pulmonary, or lung veins, X. The blood is bright red in all arteries, except in the pulmonary artery, where it is dark and impure; and it is dark red in all the veins with the exception of the pulmonary veins, where it is bright red and pure, because it has come straight from the lungs.

To stop bleeding from an artery, first of all we press with the fingers, and as most of the larger arteries run close to the bones, we can press the artery against the bone. In arterial bleeding we must always press on the side of the wound nearest to the heart, and thus meet the blood coming from the heart, as it were, and stop it spurting out of the wound.

There is a spot in most of the larger arteries where pressure can be applied with the greatest advantage, and this is called the pressure point. We should look again at the picture of the arteries which we saw when we were learning the positions of these important blood-vessels, and should notice exactly where the pressure points are for the various arteries. The pressure to be effectual, need not be severe, but must be accurately applied.

The pressure may sometimes be applied to the wound itself, and in this case we press on the point that is bleeding, with finger and thumb, and so close the hole in the artery from which the blood is coming.

But, of course, the pressure of the fingers is merely to stop the bleeding for the time being. So, as soon as we can, it will be necessary for us to prepare and apply a pad and bandage to the wound, and press the artery at the pressure point with what is called a tourniquet. Tourniquet is a French word meaning a little turn, and the instrument consists of a special strap-bandage with a screw attached. But, of course, in rendering first aid we shall almost certainly not be able to get a proper medical tourniquet, and we shall therefore have to make one up.



Twisting a bandage.

First of all, we apply a pad and bandage to the wound. We take a piece of sterilized gauze, which can be bought at any druggist, or a clean handkerchief, and fold it into a pad. The way to do this is to spread out the handkerchief, fold the corners to the centre, as in the picture on page 4616, fold over again at the dotted lines, and keep on doing this until a hard pad of the required size is formed. We place the smooth surface of the pad to the wound, and secure it in position with a bandage or another handkerchief tied round the arm as in the case of fractures. Sometimes it may be useful to put a small smooth stone inside the pad as this will considerably stiffen it.

For a tourniquet we make a pad in the manner just described, putting a smooth stone inside. This we place accurately on the pressure point of the artery, and keep it in position by passing a medium or narrow bandage round it twice and tying it on the side opposite to the pressure point. Then between the bands of the bandage we pass a strong stick, or any similar object, and twist it round and round as shown in the picture on this page, until the pressure of the pad stops the flow of blood. The stick of the makeshift tourniquet can be kept from springing back by tying another bandage over it. If we have no proper bandage to hand and are compelled to use an ordinary pocket-handkerchief, or something that will not go round the injured limb twice, we can, after placing the pad on the pressure point, pass the handkerchief round, tie the ends in a half-knot, then place the stick upon this, and tie the ends again in a reef-knot. We can then twist the stick round until we are successful in stopping the flow of blood. If there should be no stone, cork, or other small, hard object available for placing in the pad, and even no spare handkerchief from which to make the pad, we can tie a hard knot in the handkerchief which we tie round the limb, carefully seeing that the knot is placed exactly on the pressure point.

The patient should be laid down, if possible, and the injured part should be raised so that as little blood as possible may flow into it. The clothing should be removed from the wound in the correct way which we already understand. If there is anything in the wound, such as pieces of broken glass, earth, and so on, these must be removed, but we must not interfere with the wound in order to find things which we cannot see. If a clot of blood forms over a wound, this should never be disturbed, as it assists greatly in stopping the bleeding. No attempt should be made to wash a wound except with cold water which has been previously boiled.

The treatment applied for stopping bleeding from a vein is almost exactly the same as that used in arterial bleeding, except that in this case we apply the pressure to the vein on the side of the wound farthest from the heart. For an explanation of this we must glance at the diagram on the previous page. The blood is traveling along the vein towards the heart, and so we meet it, and by pressure prevent it reaching and coming out of the wound.

A common form of venous bleeding is from varicose veins. Varicose comes from a Latin word meaning bent, and a varicose vein is one which is stretched, owing to the blood accumulating in the little pockets behind the valves. Instead of being even and smooth as a vein should be, the varicose vein has swellings along its course like beads, and a slight injury will often cause the vein to bleed.

Varicose veins usually occur in the legs, and are due to various causes. Too much standing may give rise to varicose veins, and another very common cause is the wearing of tight garters. Boys and girls should always be careful that their garters are not tight. Very many people have had to suffer late in life because, when they were young, they or their friends did not exercise proper care over this apparently little but important detail.

CONTINUED ON PAGE 4828.

HOW TO UNDERSTAND A SHIP

THERE are few things more deeply interesting than learning about the various parts of a ship and how they came to be called by their present names. Frequently we see some part of a vessel mentioned in a book or in the newspapers, and sometimes we have not the remotest idea of the meanings of the terms used. In this article most of the commonest mentioned terms are fully explained, so that all of us can understand them.

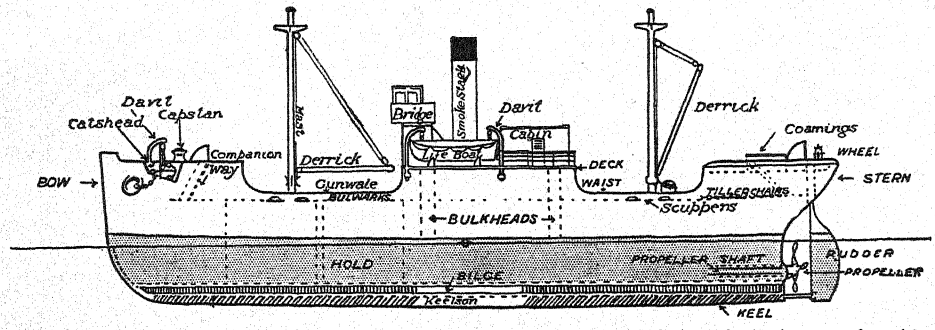
If we turn to page 251 we can see how sailors make their knots, while on page 3326 we see the methods by which they splice ropes, and on page 3959 and succeeding pages we learn the names of the different kinds of ships and sails, so none of these things will be dealt with here.

As we all know, the body of a ship without the masts is called the *hull*, which comes from the word "hole." The hull is simply a big hole with a bottom and sides, enabling it to float on water. The word *hold* also comes from the word hole. It is now applied only to the inside part of the hull where goods are stowed during the voyage. The *keel* is the long beam which goes along the bottom of the ship in the middle. In battleships and steamers this part, of course, is of steel or iron. Its purpose is to give strength and steadiness to the ship. The word comes from the Icelandic word *kiolr*, which also means a keel, and is an interesting record of how the old vikings of the North gave some words to the English language. The *keelson* is the beam in the middle of the ship's bottom to which the keel is bolted. It really means "sill of the keel." The Swedish word for sill is *svin*.

Sailors talk of a ship floating on an *even keel*. This means that her decks are quite horizontal. When sailors speak of *fore and aft*, they mean the front of the ship and the back of the ship.

The *bulwarks* of a ship are the raised sides above the top deck. They have a rail on top. Any protecting wall is called a bulwark. The meaning of the word was originally "work made with the trunks of trees." The Danish word for the trunk of a tree is *bul*, and for work it is *vaerk*. In primitive warfare the readiest means of defence was to fell trees and to take refuge behind the fallen trunks. The *gunwale*, which is sometimes spelled *gunnel*, is the side of the ship just below the bulwarks. The old Saxon word *walu* meant a stripe, or plank, and the guns in the old battleships used to be mounted above the upper wales, so that the word gunwale came to be applied to them. The *bilge* of a ship is the very lowest part at the bottom of the ship under the hold. The water that always finds its way into this part is called bilge-water, and it is pumped out periodically. Bilge simply means bulge. It is the part where the bottom of the ship bulges downwards, as we see in picture 1.

The *bridge* is the raised structure in the middle of the ship, where the captain or pilot stands when he steers the ship. It is so called because it takes the form of a bridge. The *helm* is the steering apparatus, and in a modern ship it includes the rudder, tiller, and wheel. The original meaning of the word is handle, and the German word for handle is *helm*. The *rudder* is the flat, vertical blade at the back of the ship, by which the vessel is steered. It is also called the helm, but, properly, it is only part of the helm. The most primitive method of steering a boat is by putting an oar into the water behind the boat and moving the oar from side to side. This is why we have the word rudder. The Saxon word for oar was *rother*, and the German word for oar is *ruder*.



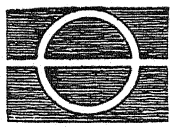
1. In this diagram of a typical modern steam-vessel we see the names of the principal parts of a ship.

In some boats the long piece of wood at the top of the rudder that forms a handle by which the boat may be steered is called the *tiller*. In Anglo-Saxon the word *tyllan* meant to lead aside, and by moving the tiller a boat is made to go to one side or the other. In large ships the tiller-ropes or tiller-chains connect the rudder with the steering-wheel. The steering-wheel is a large vertical wheel, the movement of which operates the rudder from side to side and so steers the vessel.

In a small rowing-boat there is usually no tiller, but on top of the rudder there is a flat piece of wood with a rope at each end, and the boat is steered by pulling the ropes. This flat piece is called the *yoke*. The word came from the Saxon word *geoc*, which came from the Latin word *jungo*, which means "I join." The yoke of a rudder is not unlike the yoke used for oxen and horses in some foreign countries, and the word used is the same in both cases.

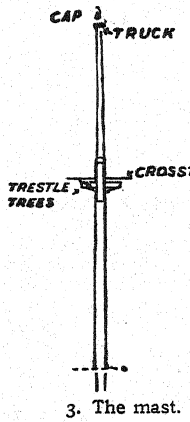
The cabins of a ship are the rooms where the passengers or the crew live and sleep.

The word cabin means a small hut, or cottage, and it is used for a small house on land as well as for the living-room or rooms of a ship. The word companion has a curious use on board ship. The *companion* is the window-frame or skylight through which light is admitted from the deck into the cabin or to the lower deck. The *companion-way* is the staircase that leads from the deck to the cabin. The *companion-ladder* is the ladder by which the ship's officers reach their cabin from the deck, and the hood placed over a companion-way is called the *companion-hood.*



2. The load-line.

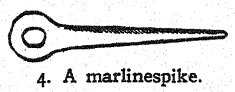
The origin of the word companion and its use on board ship are curious, and show how the meaning of a word changes through the course of years. It properly means "with bread," coming from the Latin words *con*, with, and *panio*, bread, and in ordinary use companions are people who have eaten bread together. In the old French language the word *compagne* meant the pantry in a galley, and then, as ships became bigger and more luxurious, the word stuck to the parts of the ship that we have seen. The part of a hatchway that protrudes above the deck is called by the curious name of *coamings*, but how this word came to be used is, at present, quite unknown. The *coamings* or raised edges of the hatches are designed in order to prevent the water on deck from running below.



3. The mast.

We all know that a beam is a long piece of wood, but when we hear people talk about the beam of a ship we may not understand what is meant. Beams are put across a ship from side to side of the hull, so as to give strength and stiffness, and these are still known as the beams, although in modern ships they are chiefly made of steel. But the word is more generally used to indicate the width of the ship, so that when we talk about a ship with a forty-foot beam we mean that its width from side to side is forty feet. The ship's *waist* is the middle part of the ship.

The expression that a ship *draws* twelve feet of water, or that it has a *draught* of twelve feet, means that when the ship is lying in the water the depth of water from the bottom of the keel to the surface of the water does not exceed twelve feet. When the ship is loaded with cargo we talk about *load-water draught*, and when there is no cargo in the hold we talk about *light-water draught.*



4. A marlinespike.

Upon the side of all British ships there is what is called the *load-line.* It is a mark like we see in picture 2. It means that the captain must not permit his ship to be loaded enough to sink below the surface of the horizontal line going through the circle.

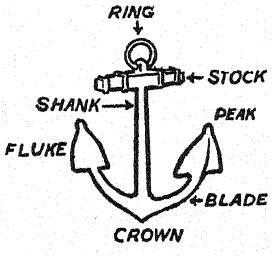
To *moor* a ship is to fasten it by ropes or chains to the quay, or to let out the anchor, so that the ship remains in one place. In the latter case we say that the ship *is at anchor* or that it *rides at anchor.* The word *moor* means to tie, and it comes from the Anglo-Saxon word *merran*, which means to tie. The *moorings* of a ship are the various chains and ropes used to make a ship remain by the quay or at its anchorage.

Everyone knows that the *anchor* of a ship is an instrument of iron or other heavy material used for holding ships in any locality required, but everyone does not know that the word came to us through Anglo-Saxon and Latin from the Greek word *ankyra*, which means a hook. The common form of anchor, as shown on page 4620, consists of the centre part, which is called the *shank*; the two curved arms which make the points are called *flukes*, and thought to be derived from the German word for wing. The flukes join the shank at the place that is called the *crown.* The cross-piece at the head is called the *stock*, and the part of the shank above the stock is the *head*, upon which is the *ring* or *shackle* to which the rope or chain is attached. When we say that a ship drags its anchor, we mean that the anchor when thrown into the sea, or *cast*, fails to hold on the bottom, and that the ship moves along with the wind or current, dragging its anchor with it. The anchors and the chains or ropes attached to them are called *ground-tackle.* See pictures 5 and 6. The two words *windward* and *leeward* are frequently used. The former almost explains itself. Windward means the direction from which the wind is blowing, and leeward means the direction to which the wind is blowing. The word *lee* means shelter, and comes from the Anglo-Saxon word *hleo.* The lee side of a ship is the sheltered side. There are two other words that go together in nautical language. They are *starboard* and *port.* The words used to be *star-board* and *larboard*, but these were too much alike in sound, and there were accidents because sailors sometimes misunderstood orders, so the word *port* was adopted and is used instead of larboard. The rudders of old ships were frequently a little to the right side of the ship, and the right side of the ship thus came to be called the *steerboard* or *starboard* side. The left side of a ship was the side where there was no rudder, and it was therefore called the *leerboard* or *laer-board* side, *lear* being an Anglo-Saxon word meaning empty. The right and left sides of a ship mean the sides on the right and left hand when we stand on the ship looking towards the bow.

The *stern* of a ship is the back part. Stern means steering, so no explanation is necessary as to why the word stern came to be used. The bow of a ship is the front end, and it comes from the Icelandic word for the bow of a ship, or for a shoulder. The *bowsprit* is the name given to the spar which projects from the front of a ship. The word sprit means spar, so that the bowsprit means the spar at the bow. The *catsheads* are two strong beams projecting from each side of the bow. Their purpose is to enable the anchor to be raised and lowered without touching the side of the ship. Why they are called catsheads is now a mystery.

The *galley* of a ship is the cook's quarters and also the cooking-stove, but it originally referred to a ship that was rowed by oars, which were usually worked by slaves or convicts. It is still used as the name for the large boat used by the captain of a man-of-war. If we have been on board a ship, we must have seen the small boats that are suspended from bent iron posts, that are turned round when the boats are to be lowered into the sea. These bent posts are called *davits*, a word which was originally *Davids*. The reason why they were called Davids is now quite unknown.

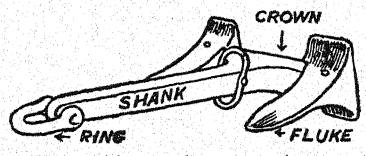
The *capstan* on a ship, or on a wharf, is a revolving drum upon which ropes or cables are wound. The anchor is raised, or *weighed*, and lowered, or *cast*, by the help of a capstan. The Latin word *capistro* means "I tie with a halter," and this word traveled to us through France, undergoing changes during the course of hundreds of years until it became capstan. On ships of large size there is always a kind of gutter round the edge of the deck. The water that falls on the deck runs into this gutter, and there are holes through the side of the ship by means of which this water is discharged into the sea. Both the gutter and the holes are called the *scuppers*, a word which comes from French and Latin and means "spitting out."



5. A common anchor.

In loading and unloading a ship, the *derrick* is used. The derrick is the hoisting apparatus, and consists of a swinging spar attached to the mast and worked by ropes, as we see in the diagram on page 4618. The origin of the word derrick is gruesome. It was the name of an English hangman about three hundred years ago.

As a package is being hoisted out of the hold, and is suspended from the end of the derrick, it may suggest the work of the man whose name it means. The partitions in a ship are usually called *bulkheads*. They are generally made water-tight, so that a leak may be prevented from flooding the entire ship. Bulkhead means the head or end of a bulk, which, in one sense, is used to mean the hold or hull of a ship. We all know what masts are. The word *maest* in Anglo-Saxon meant the stem of a tree, and, as what we now call masts were made from the stems of trees, it was quite natural that they should be called by their present name. The *rake* of a mast is the distance that it leans backwards. Masts are not perpendicular; they always lean back a little. The Scandinavian word *raka* means "to reach," and the word rake came to be used because the mast takes a slanting position. The word rake is also used to mean the slope of the bow or stern of a ship from bow-rail to keel, or from stern-rail to keel. The *gaff* is the spar attached at one end to the mast and having a trysail attached to it. We see a trysail and gaff on page 3959. The word is supposed to be derived from the Gaelic word *gabh*, which means "take," but it is not clear how it came to be used for the spar to which it is applied. The longer spar at the bottom of a trysail is the *boom*, a word which comes from the Dutch word *boom*, meaning a tree. The *crosstrees* are short spars fixed across the upper ends of the lower masts and top masts, as we see in picture 3. They are used to support the upper rigging. The first part of the word describes the position in which they are placed, and the second part—the word tree—came to be used because they were made from parts of a tree. The *trestle-trees* are other cross-pieces that support the crosstrees. The *cap* is the metal fitting that enables the lower mast to be joined to the upper mast. It is easy for us to understand how the name came to be applied, because the fitting is at the top of the lower mast. The *truck* is the circular piece of wood at the point of a mast, pierced with holes through which the ropes used to hoist flags are put. It is called the truck because of its shape, the word being derived from the Latin word *trochus*, which means a wheel.



6. The stockless anchor, as used on most liners and battleships of the present day.

Perhaps one of the commonest words we meet with in connection with a ship is *forecastle*, the term applied to the forward part of the upper deck. Generally, the place where merchant sailors eat and sleep is called the forecastle, or, as seamen say, foc'sle. At one time war vessels were built with a short upper deck, that was elevated like a castle to command the enemy's deck. As this was in the forepart of the boat, we can easily see how it came to be called forecastle. Right at the other end of the ship is the *poop*, or deck, built at the stern of the boat. The *poop-cabin* is naturally the cabin directly underneath. Another common word used by sailors and by writers about the sea is *marline-spike*. It is a spike or pointed iron pin used in *marling*, or separating strands of rope as they are being spliced. A *marline*, consisting of two strands loosely twisted, is a small rope for winding around thicker ropes, and comes from the Dutch word *marren*, which means "to bind." See picture 4. There are many hundreds of words used about a ship, and we have been able to consider only a few of them. For instance, the word ship itself came to us from our Anglo-Saxon forefathers, who in their language called it a *scip*, which we have transformed into the word we now use. Then the word *deck* means a cover, and comes from the Danish, where the word is spelled *dek*, and is taken from the verb *dekken*, meaning to cover. The deck is simply the cover of the hull. All these words may refer either to sailing ships or steamships. Every steamship has a smoke-stack, which is also called a funnel.

CONTINUED ON PAGE 4705.

WHAT THIS STORY TELLS US

THIS is the story of a band of men, who have kept the history of their country free from the record of crime which is often the lot of new countries, before a settled government can be organized. These brave men carried law with them into the most unsettled parts of the farthest North. No difficulty has been too great for them, and no distance too long for them to travel in the pursuit of their duty. They taught the Indians the justice of the white man's law, and to them is chiefly due the fact that the Canadian Northwest has never known the horrors of Indian warfare. The first members of the force left behind them a tradition of high ideals which has been lived up to by their successors, and the example which they have created is being followed by other men, who are now doing the same work in other places.

THE ROYAL NORTHWEST MOUNTED POLICE

CONTINUED FROM 4328

OVER the vast prairies of the Northwest there rides a troop of scarlet horsemen. This little band of just over a thousand men keeps peace and order over a country nearly half the size of Europe. Their beat lies from Hudson Bay to the Pacific and from the American boundary to the Arctic snows. These brave men are known to the world as the Royal Northwest Mounted Police.

After the Hudson Bay Territory became a part of the Dominion of Canada, it was found necessary to provide some means of protection to those who might settle in the new territory. In 1873, the British Parliament gave the Canadian government authority to organize a force called the Northwest Mounted Police. The same year one hundred and fifty men were sent from Eastern Canada. That was the beginning of the movement that resulted in putting all of the Northwest under these men. In 1914, the strength was raised to over twelve hundred. King Edward VII was so pleased with their work that he added the title of Royal to their name.

The force is in charge of a commissioner and an assistant commissioner. The vast territory is divided into eight districts and over each a superintendent has control. Scattered throughout the region are more than a hundred stations. Twenty-nine inspectors assist the superintendents in their work. They have authority to hold court and try criminal cases. Inspectors are commissioned officers. Surgeons look after the welfare of the men and a corps of veterinary surgeons attend the horses. The headquarters is at Regina. In the North the two important posts are Whitehorse and Dawson City. The whole force is under the control of the Department of the Interior.

A TROOP RECRUITED FROM MANY CLASSES

The Mounted Police is a combination of all sorts of men. For many years, the son of Charles Dickens served as a constable. Dukes, earls, and barons look back with pride to the days when they chased Indians and cattle thieves garbed in the scarlet tunic and the blue trousers. Hundreds of Oxford and Cambridge men have done duty on the plains. Whatever has been the previous life of the recruit, whether clerk or duke's son, student or farmer, he soon becomes but one of a class and but one uniform among many.

All recruits are between the ages of twenty-two and forty. They must pass a rigid physical examination and

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possess certificates of exemplary character. They must not weigh over one hundred and seventy-five pounds and must be unmarried. After acceptance, each is given a horse. It takes months of training before they are ready for duty.

THE DRESS OF THE POLICEMAN AND HIS LIFE IN BARRACKS

In a western town you may meet our friend as a natty cavalryman. From the button on his cap to his burnished spurs, he is as spick and span as any trooper in the Imperial service and looks exactly what he is, a smart, active soldier. On the prairies, he will change his dress to a large cow-boy hat, a bright red shirt and blue trousers, with broad yellow stripes running down the side and disappearing into high laced boots. If duty calls him to the rough frontier, you will find him in buckskin shirt and horsehide overalls.

In barracks, the life is regulated on military principles. Every quarter or half hour, the bugle calls the men to a duty, the same as in a military camp. The men have their rations, their mess and their canteen. Each constable looks after his own horse. Each commissioned officer has an attendant, chosen from among the constables. He pays this man five dollars per month additional out of his own pocket, and the man is relieved of guard and of some other duties.

THE DUTIES OF THE ROYAL NORTH-WEST MOUNTED POLICE

There is hardly a department of the Canadian government that is not assisted by these pioneers of the North. They act as customs officials along the border and enforce the export tax of two and a half per cent. on gold dust. They carry the mails to remote mining camps, act as sanitary officers, report on bridges, roads and crops, take the census and prevent theft from the Crown timber lands. They are the good Samaritans of the wilderness. Their willing hands rescue wayfarers fainting in the snow. They are frequently called upon to care for the sick and the dying. It is little wonder that the needy and the suffering, as well as the lawless, should know these gallant fellows.

The enforcing of law and order is perhaps their most important duty. Officers of the Mounted Police are not exponents of the law but law itself. They hold court and try criminals. At Dawson City and Whitehorse penitentiaries are maintained. The officers make monthly trips to hold courts at remote stations. Very frequently a trip of sixty miles is made with a dog team and with the thermometer at seventy degrees below zero. They have made the strong arm of British justice a terror to evil doers and a defence to the peaceful colonist.

The Indians have learned to respect, and at the same time to fear, the Mounted Police. They know that they will receive fair treatment at their hands but they also know that if they do wrong they will certainly be punished. In 1896, the United States authorities returned to Canada some hundreds of Cree Indians who had taken refuge there at the time of the Riel rebellion. These Indians were afraid to come back. They were treacherous and caused the American authorities much trouble. They were ordered to return to Canada and several detachments of the United States cavalry escorted them to the border. The Indians were sullen and trouble was expected. A sigh of relief was given when the border was reached. You can imagine the surprise of the American soldiers when they were met by three mounted police to receive the Indians. A strenuous time was expected, but on the contrary the three policemen mingled with the redskins and handled them as easily as if they had been children. It is the just treatment that the Mounted Police have always given to the Indians that makes this possible.

CHIEF CROWFOOT AND THE JUSTICE OF THE WHITE MAN'S LAW

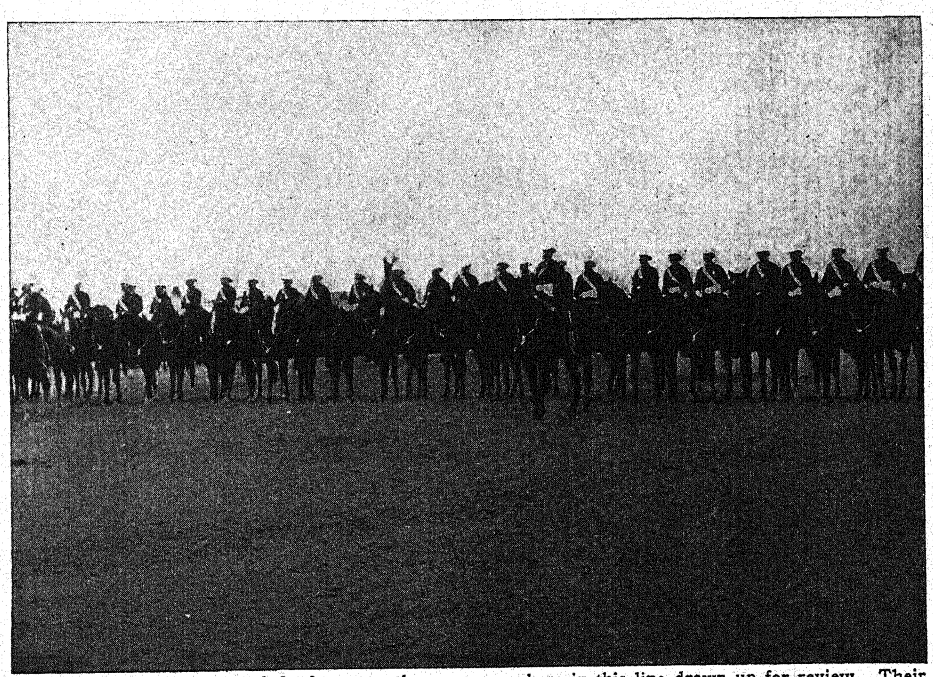
The Blackfoot tribe was once the most warlike within the Canadian borders. Their chief, Crowfoot, was a brave, noble and proud old savage. One day a sergeant of police with two men came to the camp and demanded that two braves who had committed a crime be delivered up to them. The chief refused but finally consented on condition that he might go and see the trial. When it was found that the punishment was fair and just, Crowfoot said, "This is a place where the forked tongue is made straight; when my people do wrong they shall come here."

The police look after the redskins in time of need and give to each the food supplied by the government. They will as quickly punish a wrong done to an

THE BEST POLICE FORCE IN THE WORLD



Here are two members of the Canadian Mounted Police, one on patrol, and the other carrying the mail down to the Post Office in Dawson City. These two vigorous young men are fair types of the membership of this body. The men on the force fear no danger, and are ready to face any difficulty at a moment's notice. Photographs by Paul Thompson, New York.



There are seldom so many of the force together as we see here in this line drawn up for review. Their scarlet coats are the sign of law and order over many thousand square miles of the Northwest. Wherever they go, good people feel safer and criminals are uneasy, for a chase once begun is never given up. Troopers have been known to travel hundreds of miles and spend months in tracking a fugitive.

Indian as to a white. They will as readily give assistance to a redskin, and many a journey has been made over dangerous paths and through icy mountain passes to give aid to an injured or to a sick Indian. The Indians have come to love their guardians, the lone horsemen of the plains.

MEN WHO KNOW NO FEAR IN THE PURSUIT OF DUTY

The scarlet-clad horsemen are known for their reckless, dashing bravery and their cool, calculating courage. They face death without a trace of fear and never falter when duty calls. They glory in the close pursuit of criminals and horse thieves. At Golden, in the heart of the Rockies, there was a rough mining camp. Major Steele was in command of the police. One night a riot broke out among the miners and Sergeant Fury was sent with two constables to arrest the ringleaders. The rioters were in possession of a saloon. Fury entered and going directly to the man he wanted, said, "Come with me; I arrest you." The burly miner had no intention of obeying the command. Fury, with revolver in right hand, clutched the miner by the collar and slowly backed to the door. It was like throwing a child in a lion's den. In front of the plucky little sergeant was a mob of swaying, swearing miners. Suddenly a huge desperado made a plunge for Fury from behind. Fury never faltered; as quick as a flash he shot directly over his head and at the same time kept slowly backing to the door. The bullet struck the desperado, and in the lull which followed, the miner was taken from the saloon. As the prisoner was being hurried to the barracks, the miners followed to make another attempt to rescue their comrade. Just as a bridge which spanned a small stream was crossed, a man with sword in one hand and revolver in the other tore madly down the hill and took his stand in the centre of the bridge. It was Commander Steele, whom the noise had aroused from a sickbed. He declared that he would kill the first person who attempted to cross. The miners weakened and skulked away. This is only one of many incidents in the lives of these men. The outside world very seldom hears of their acts of bravery. They do things rather than advertise themselves. Woe befall the man who is sent after his man and fails. It means disgrace in the eyes of his comrades and a sentence of three months' hard labor from his commander. No "bad" man in the territory of the scarlet horsemen amuses himself by "shooting up" the town. During the first year of the construction of the Canadian Pacific Railway not a single crime was reported. Where else in the world is such a record found?

THE GREATEST DETECTIVES IN THE WORLD

Before starting down the great Yukon, each small boat is numbered and registered and the names and business of its passengers recorded. This very often proves of valuable assistance to the police in identifying murdered travelers and in giving clues to the murderers.

It would seem that in such a vast wilderness, a favorable hiding place for desperadoes of the worst type, it would be almost impossible to detect a crime and punish it. The records of the Yukon show just the contrary. No sleuth-hound ever followed the scent more thoroughly than do the Mounted Police in running to earth a criminal. Let a humble miner's pack be stolen and forthwith a careful search that may cover hundreds of miles will be made. Sometimes it will be discovered that the thieves were bears. Distance is no object. To secure one witness in a murder trial, two police officials traveled four hundred miles by dog team and thirteen hundred by canoe.

The classic motto of the Mounted Police is "Get the Man." In no place in the world is the motto followed so diligently and with greater success than by these pioneer police. The trail may lead across continents, may lead over hundreds of miles of ice and snow, but the persistent and tenacious sleuth never gives up hope, plods on, following clue after clue, and he invariably succeeds in securing his man. Their success makes the whole force the terror of the law breakers and the pride of the Dominion.

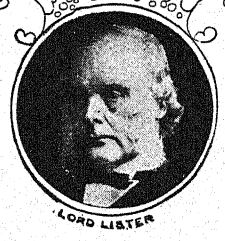
These brave, open-hearted fellows are most loyal to their comrades and have a high sense of duty. Their brave deeds they never mention and so most of their acts of courage are unknown to the world. They rule supreme over a vast wilderness and do their work well. Is it then to be wondered that whites and Indians respect, love and fear these gallant fellows?

THE NEXT STORY OF CANADA IS ON PAGE 4831.



THE WORLD'S GREAT DOCTORS

CONTINUED FROM 4555



NO lives have been more important to the well-being of the world than the lives of the great surgeons and physicians. Without these men the human race must have been very much reduced by the many diseases fatal to man. Even to-day, in spite of science, pestilence carries off millions of people every year in India and elsewhere. But for the skill of the doctors, similar conditions would prevail throughout the world. If North America had a death-rate as high as that of India, the land would be an empty wilderness in the course of a few years, as the birth-rate on this continent is smaller than in India. Our doctors not only cure us when we are ill; they teach us to observe laws which, if followed, will, generally speaking, keep us in health.

There never was a time in the history of man when there was no attempt made to heal wounds and diseases. We have no written books to tell us about the doctors of the old-time peoples, but, nevertheless, the story is written for us in bones of men that have been found. Remains of men who lived thousands and thousands of years ago show us that many of these men sustained dreadful injuries, and that the doctors of those times cured their hurts. Skulls have been discovered from which damaged bone had been removed and new bone put in. A surgeon is able to tell whether the operation was successful. He finds the new bone knitted to the old, and knows that the surgeon succeeded in his task. We find not only broken heads that have been cured, but bones which show that injured arms and legs were cut off by rough flint implements, and were healed in spite of the very crude treatment they received. But we find many other examples of operations which were not successful; the unknitted bone shows that the patient died, in spite of the attempts of his doctor.

What a wonderful story of the past these signs tell us! Men were savages, living by battle with one another. Their lives must have been desperately hard and cruel. Injuries to bones which we are able to say were those of women show that the women of savage days shared the battles of the men, and were hurt as badly. The men and women fought for their flocks and herds, their pastures, their watering places, the caves in which they lived. In these fights they inflicted and received terrible injuries from arrows and spears of flint, from hatchets of stone

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and from fragments of rock which were thrown at them.

But the old-time savage man had some tenderness in his heart. He set the broken bones of his wounded kinsman, and the woman nursed the stricken warrior. For months, while injuries to head or limbs were healing, they had to feed and nurse the wounded, and this they did, as we know from the signs which show that the injured recovered.

All this surgery was very rough and clumsy, and many, many centuries were to pass before men became skilful. Until quite recently it was supposed that surgery proper began with the Egyptians. But the marvelous discoveries in Crete, which tell us of a wonderful civilization there, of sea-power and of military feats which gave the Cretans a vast empire thousands of years before the birth of Christ, remind us that there must have been accomplished surgeons and physicians in that land long before surgery was supposed to have been known in Europe, and even before it was known in Egypt.

We must, however, go back to facts of which we are certain. Let us for a moment clearly distinguish between medicine and surgery. Surgery means the treatment and cure by operations of injuries to the body. The repair by medicine was largely superstitious practice—charms and incantations and all manner of nonsense. In surgery, however, they did remarkable things considering the state of knowledge at the time. There exist papyrus documents, dating from 3,500 years before Christ, from which it is plain that at that time it was a common thing to practise quite difficult surgical operations; and surgical instruments have been preserved which were made in very early times in Egypt.

MOSES, A GREAT DOCTOR OF EGYPT, AND HIS WISE LAWS OF HEALTH

The first great doctor in Egypt was not one of the sorcerer surgeons of the Pharaohs, but Moses, the great Hebrew leader. He did not cut off diseased limbs, nor did he with his own hands make medicine for the sick. But he had a wonderful knowledge of the laws of health, and made the Israelites follow a code of regulations for their cleanliness and well-being, which preserved them in health and vigor for the forty years of their wanderings in the wilderness, and remained a heritage of health to the nation afterwards.

If the splendid laws for health which Moses drew up, fourteen centuries before Jesus was born, could be enforced in our days in the cities and in all the lands over which the Stars and Stripes fly, they would save thousands and thousands of lives every year. There was no mystery about his methods. His laws, which are written in the Old Testament, are plain, sane rules of matter-of-fact science.

HIPPOCRATES, "THE FATHER OF MEDICINE"

After Moses, the first great doctor whom we can name is the great Hippocrates, who was born about 460 years before Christ. Hippocrates, who was a Greek, was born in the island of Cos, off the coast of Asia Minor, which is famous as the birthplace also of Apelles, the great painter. For many generations his family had practised medicine, and the people's attitude towards them gives us a curious insight into the mind of the time.

It was believed that they were descended from Asclepias or Æsculapius, who, Homer says, was a skilful physician, and whom the Greeks revered as a god. Hippocrates became a physician-priest or priest-physician of Æsculapius, as the rest of his family before him had been. The temples of Æsculapius were carefully chosen to get the fullest measure of sunlight, pure air and water and shelter from cold winds. Within the building was the temple proper. Without were porticoes, which formed what we should now call hospital wards, and there sick people prayed to their gods, and were treated for their ailments by the priests.

OLD DOCTORS WHO KNEW NOTHING ABOUT THE WORKING OF THE BODY

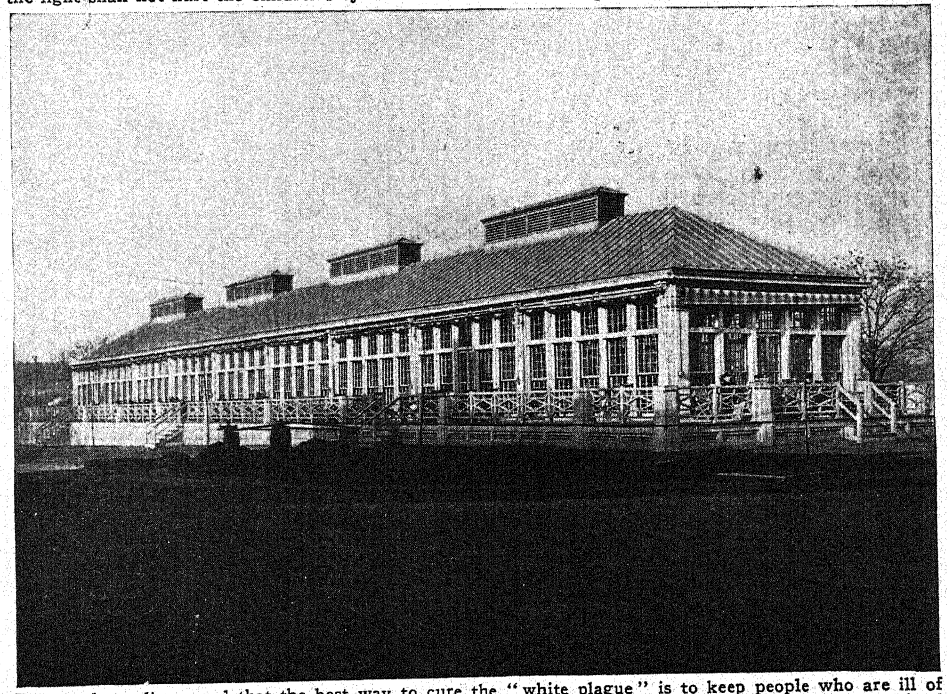
So far no man knew anything about the action of the human heart, about the motion of the limbs, about the action of the lungs, about the process of digestion, or about the manner in which heat is maintained in the body. Naturally, then, treatment was very simple. Not understanding the working of the human body, they could not have any clear idea as to the illness from which a patient suffered. To treat a disease under these circumstances, is, of course, practically impossible. Hippocrates altered this greatly. He studied hard, and introduced a new and great system.

When a person was ill, Hippocrates carefully observed the progress of his illness. He saw that persons suffering

FRESH AIR CURES YOUNG AND OLD



The care of children when they are sick, so that illness may not hurt their growing frames, is a most important part of the work of our hospitals. This is a picture of an open air ward in Johns Hopkins Hospital, where sick children are nursed back to health. See how carefully the cots are placed so that the light shall not hurt the children's eyes. You can see that in spite of illness, the children are happy.



Doctors have discovered that the best way to cure the "white plague" is to keep people who are ill of tuberculosis in the sun and air. Therefore the City of New York has built this pavilion on an island in the river. The poor people of the city in the first stages of tuberculosis are sent here, and every effort is made to nurse them back to health and strength.

Photographs by Brown Bros., New York.

from similar illnesses were affected in the same way. Therefore, by observing the ordinary course of the disease, he was able to predict what would happen, to prepare for the stages which were to follow, and to be ready to grapple with every new feature of the illness. He made careful notes of the diseases that came under his care, and is the first physician who is known to have left records of the progress of his patients to guide the study of those who came to him for instruction, and who followed his principles after his time.

Before he began to teach doctors had been mere blundering machines; Hippocrates made them observant, thinking, skilled men. Of course, there was more in his system than this, but the youngest of us can see that to have done even so much was an important fact in the history of medicine.

THE GREAT WORK THAT HIPPOCRATES DID FOR ALL MANKIND

Many zealous students gathered about Hippocrates, to learn his ways and carry out his laws. He made them all take a solemn oath to respect their teacher as a father, to share their knowledge freely with their fellows, to behave with stainless honor and never to divulge a secret learned in the sick-room. This oath is still respected by all good physicians of our day, and Hippocrates' name is held in honor by the members of his profession. He died some time between 377 and 359 B. C.

His writings were a great gift to the world, although men were not then wise enough to understand all that he really had done for the cure of the human body. One of his discoveries was that the course of certain diseases may be traced by listening to the sounds in a patient's chest. It took 2,000 years to make that knowledge really useful, and then Laennec, a doctor in Brittany, invented the stethoscope, an instrument which every doctor now carries, because it enables him to hear the beating of the heart and the movements of the lungs.

The work of Hippocrates was followed up at the great school of learning at Alexandria, but men broke away from the sound science which he had taught, and drifted into mysteries and folly. Not until the time of Galen was there a return to sound teaching.

Galen, who was also a Greek, and lived to be an old man, was born at Pergamus, in Asia Minor, in 130 A. D. He studied at home, and afterwards at Smyrna, Corinth and Alexandria. His close study of physiology and his clear reading of the teachings of Hippocrates made him famous as a physician. He practised for a time in Rome, where he was far ahead of all his rivals in knowledge and in skill. They hated him for this, and managed to have him driven from the city. Some people say that in his later years he went back to his native place and died there in the year 200 A. D., while others maintain that he went to Sicily and lived there until the year 210 A. D.

HOW GALEN TAUGHT THE DOCTORS OF EUROPE FOR A THOUSAND YEARS

Galen gathered together all the safest teachings of those who had gone before him, and added to these the results of his own observations, and for a thousand years the teachings of Galen were all that Europe had to go upon in the science of curing disease.

It is wonderful to-day to see how much he knew, and yet how much he did not know. To those who had gone before, the nerves were mere mysterious tendons. Galen learned that the nerves are the telegraph wires of the brain, and that without them there is no feeling. Other men had been mystified by the muscles, but Galen found that they hold the power by which the work of the body is performed. He knew what the muscles *did*, but he could not tell *why*. "The limbs of animals have weight," he wrote, "and, like other heavy bodies, they tend to fall to the ground. Why is it, then, that they are able to move in every direction?"

Galen was the first man to judge of health by the pulse of a patient, yet he did not understand that the pulse was affected by the action of the heart.

Galen knew nothing about chemicals. All his medicines were made up of vegetable matter or animal matter. One prescription of his for a serious form of illness consisted of powdered snails, galls, and pepper! Still, it was not his actual prescriptions, but the great laws that he made, which were so important.

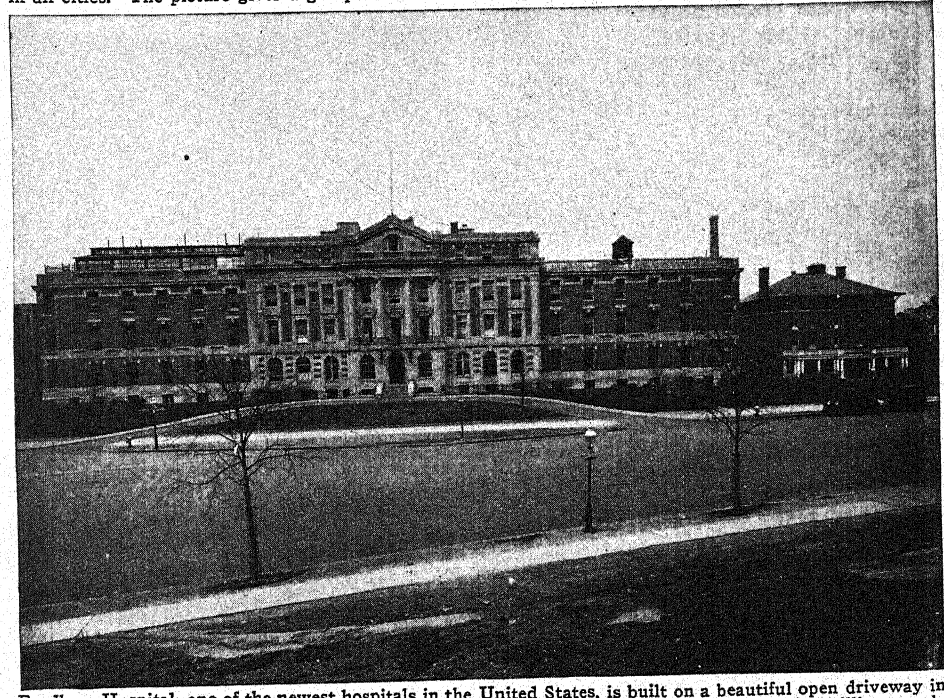
HOW THE ARABS TREASURED UP THE WORKS OF THE GREAT DOCTORS

Unfortunately for mankind, Galen's laws were not generally observed. In the centuries during which the Roman Empire was slowly breaking up, Hippocrates

GLIMPSES OF TWO GREAT HOSPITALS



Bellevue Hospital in New York found that many poor people in the city could not afford carriages to take them to the hospital when they were sick. Therefore, the hospital began to send a conveyance called an ambulance for patients who were very ill. The idea soon spread, and ambulance services are now found in all cities. The picture gives a glimpse of Bellevue Hospital, which is one of the largest in the world.



Fordham Hospital, one of the newest hospitals in the United States, is built on a beautiful open driveway in the Bronx, a populous and important borough of New York, where about three-quarters of a million people make their homes. A hospital such as this, where patients are nursed in large, airy wards, in surroundings of exquisite cleanliness, is a great advance from the times they were shut up in close, airless rooms.

and Galen were almost forgotten by Europeans, but the Jewish and Arabian physicians treasured the works of the two great men. Their writings were translated from the original Greek into Arabic, and later again into Greek and Latin, and it is small wonder that in the end the works became too complicated to understand or so incorrect as to be worse than useless. Physicians in the Middle Ages were generally superstitious, and it was not until modern times that they really began to understand the laws of health.

We must not think, however, that in all these years no work was being done in surgery or medicine. Remnants of the learning of the great Greeks lingered long in Greece and Italy. In fact we may say that its feeble light never really died out, but was swallowed up in the brighter flame of the new learning of the Renaissance.

SOME FAMOUS SCHOOLS OF THE MIDDLE AGES

As early as the ninth century, when Alfred the Great reigned in England, we find records of a famous medical school at Salerno in Italy. In the eleventh century the teaching at this school was in the hands of the Arabian physicians of whom we have just spoken. It is said that William the Conqueror journeyed to Salerno to be cured by them.

As the desire for learning spread, universities grew up or were founded, and most of them included schools of medicine. By the middle part of the thirteenth century the universities of Bologna, Padua, Rome, Pavia and Montpellier were famous for their medical schools and to these schools doctors flocked from other parts of Europe, to study at these universities, just as in our own time men have gone from America to Europe, and it is interesting to learn that women were admitted to them, and were more than once either professors themselves, or assistants to the professors.

William of Salicet, a great Italian physician, wrote about wounds. His pupil, Lanfranchi of Milan, who taught at the University of Paris, and was a greater man than he, wrote about the difference between hemorrhages, or bleeding, from the veins and from the arteries. He was followed by Guy de Chauliac, a Papal physician who performed many dangerous operations, and wrote a great book on surgery, which has never been forgotten since his time. This great man taught at the University of Montpellier.

After de Chauliac's time, the first great names we come to are those of Paracelsus, a Swiss, who is best known as a writer on medicines, and Ambrose Paré, a French surgeon. Paré was born near Laval at the beginning of the sixteenth century. He joined the French army as a surgeon, and proved himself a man of entirely original mind. In the wars he showed himself to be as merciful as he was skilful. He sought not only to heal men of their wounds, but to heal them by the tenderest means. He learned how to tie up the arteries which had been cut through, and so to stop the bleeding. He greatly improved the treatment of wounds caused by gunshots by using cold oil in dressing them, instead of the boiling oil that had hitherto been used. In many ways he improved surgical practice, and taught Europe his methods by writing of his discoveries, so that all who wished might read.

Paré studied at Paris, which had long been noted. Padua was still famous, however, and it was to this school that Linacre, who was afterward physician to Henry VII of England, went to study. Linacre, however, is not remembered for his learning in the science of medicine, though that is said to have been great, but because he founded a college for physicians in England. John Caius, physician to Queen Mary of England, was also a student at Padua. He is remembered as the founder of Caius College at Cambridge.

A much greater man than these two was Andreas Vesalius, who was born in the city of Brussels in the year 1514. He studied at the University of Louvain, and afterward at Montpellier, Paris, Venice and Padua. He taught and wrote much, and was brave enough to attack the writings of Galen that had been followed so long. Later he became physician to Charles V, a position his father had held before him. After the death of Charles, he was asked to become professor of anatomy at Venice; but was drowned on his way back from the Holy Land, to which he had made a pilgrimage. He is honored by physicians as the founder of a great deal of the modern knowledge of anatomy, and especially of the structure of the human brain; Fallopius, who was one of his pupils, and a great man named Eustachius, are also men of about his

time who are well known in the history of medicine.

WILLIAM HARVEY, DISCOVERER OF THE CIRCULATION OF THE BLOOD

In spite of all that these men did, however, there was still great ignorance of the working of the human body. Up to the beginning of the seventeenth century all the doctors who studied anatomy, that is, the structure of the body, were as much puzzled by the flow of blood, and the heat of the body, as we should be by the motion of a motor car if we knew nothing of the working of the engine which draws the car.

Something had been learned, however. In the time of Vesalius, Servetus, a Spanish physician, discovered that the veins have valves which force the blood in a certain direction. Servetus was followed by Fabricius of Acquapendente, a professor at Padua, who learned a great deal about the circulation of blood in the lungs. Then came William Harvey, who showed that it is when the heart contracts that it does its work, that it is then that it sends the blood to all parts of the body. Some men had already come near this truth, and some Italians say that Caesalpinus, one of their noted doctors, had discovered it before Harvey. This, however, is not believed to be true. It is generally believed that Harvey made his discovery quite independently of anything that Caesalpinus may have done, and those of us who have read the story of the telephone can easily see how two men may make a discovery without either knowing of the other's work.

William Harvey was born in Folkestone in England, in 1578, and went first to Caius College at Cambridge, where he took his bachelor's degree. Then he determined to study medicine, and as the Italian schools were still far in advance of any of the English schools, he turned his steps to Padua, where he won a doctor's degree. From Padua he went to Bologna, and to Pisa, and then having gained all that Italy had to teach him, he returned home.

All this time he had been studying the problem of the circulation of the blood, to which it is probable his thoughts had been turned by Fabricius. After he went back to England, he continued his studies, and in 1616 was able to announce his discovery of the circulation of the blood.

It was a great discovery. There is no doubt that Harvey knew of its greatness, yet he made his first announcement simply and modestly in a lecture to a class of only a few students in London. When the older doctors heard of it, some of them denounced him fiercely, but he lived to see his discovery believed in by all. Some years later, an Italian named Malpighi discovered the capillary veins and thus completed Harvey's work.

By this time much had been learned of the human body and its working. As we have seen, there were in every century great and learned men in the medical profession. But toward the end of the Middle Ages, the practice of surgery fell largely into the hands of men who were called barber-surgeons. In other words barbers were often called in to do the practical work of operations. Physicians and surgeons who were in attendance on sovereigns, and a few who were noted for their learning, were looked up to and respected, but the great number of doctors were still ignorant and superstitious.

PHYSICIANS OF THE SEVENTEENTH AND EIGHTEENTH CENTURIES

This state of things, however, began to change in the seventeenth and eighteenth centuries. Much was done in Holland for medicine by Hermann Boerhaave, who was born near Leyden in 1668. He was not only a physician but a chemist and botanist, and was, therefore, able to teach the real nature of some of the medicines used. He taught his students not only from books, but made them study diseases at the bedsides of patients, so that before they began to practise as doctors, they might themselves know from experience the nature of the illness they undertook to treat. In England the change was largely due to the work of two brothers, William and John Hunter, who were born in a little town in Lanarkshire in Scotland. William Hunter spent five years in the University of Glasgow and afterwards went to London, where he became a surgeon. John Hunter studied with his brother William and in the great London hospitals. He was an army surgeon for a time, but later settled down in London, and devoted himself to the practice and teaching of his profession and the study of anatomy. He paid special attention to comparative anatomy, or the structure of the bodies of various animals as compared with one another and with man. This study is very important

and through it many of the great discoveries have been made.

EDWARD JENNER, WHO DISCOVERED VACCINATION

One of John Hunter's pupils who became famous was Edward Jenner, the discoverer of vaccination. He was born at Berkeley in Gloucestershire, England, in 1749. After his training under Hunter, he settled down in Berkeley, and there for years he studied the subject of vaccination for smallpox.

He believed and hoped that by spreading vaccination throughout the world, smallpox would be entirely stamped out of existence. At first his theory was hotly opposed, and there is still opposition, but, after a year, more than seventy of the leading medical men of London signed an article declaring their faith in it. News of the discovery was carried throughout the civilized world, and Jenner received very many honors, while Parliament gave him $150,000. He died in his native village at the age of seventy-three.

While, as was said above, there is opposition to vaccination by people who do not think it wise to introduce sick matter into a well body, the defenders of the practice point to the fact that in former days there were epidemics of smallpox which swept away thousands and made the people go wild with terror. Now no one fears smallpox very much and deaths are less frequent. Jenner also taught the difference between typhus and typhoid, and curiously enough, people who are now likely to be in danger of infection from these latter diseases are vaccinated also.

THE LONG SEARCH FOR SOMETHING THAT WOULD BRING SLEEP

After such advances in surgery had been made that important operations could be performed, surgeons began to look for some drug that would enable them to put their patients into a deep, quiet sleep, during which they would feel no pain. This is what doctors call "*producing anaesthesia,*" and it is only when anaesthesia is produced that a patient can stay quiet enough to let a surgeon do the wonderful things to which in our day we have become accustomed.

In the early nineteenth century, such men as Dr. Ephraim McDowell, of Kentucky, had performed serious operations, while the patients were conscious of pain, but never except when the doctor saw that, without an operation, the patient would quickly die. You can see, therefore, how important an "*anaesthetic*" is, and that is why for a long time the thoughts of men of science had been turned toward finding this blessing to mankind.

The writings of the Greeks seem to show that they knew of some drug, the use of which made people unconscious of pain, and it is said that a famous Italian surgeon of the thirteenth century used a preparation of mandrake for this purpose. Even if this were true, however, the knowledge had been lost, and it was not until the nineteenth century that men succeeded in their search for some substance that would for a time lull the sense of pain to sleep.

The great chemists of whom we may read in other parts of this book showed the way. Sir Humphry Davy, who in his youth began to study surgery, discovered that nitrous oxide would produce anaesthesia, and this gas is still sometimes used by dentists when they have to pull out a painful tooth. A little later Michael Faraday said that sulphuric ether could be used as an anaesthetic. The knowledge thus gained was first used in America.

THE MEN WHO DISCOVERED ANÆSTHETICS

Just twenty years after Faraday's discovery, Dr. Crawford W. Long, of Jefferson, in Georgia, used this gas to enable him to perform a very difficult operation which would have been impossible without it. The importance of what Doctor Long had done did not, however, become widely known, and it is only in this century that he has received honor for his work. He was one of the quiet great men who do much good in their own community, but, perhaps because of the greatness of their humility, lose sight of the importance of their deeds. Meantime the search went on, and in 1844, two years after Doctor Long's use of ether, a dentist named Horace Wells, of Hartford, used nitrous oxide when drawing teeth, but soon dropped its use. About the same time Dr. W. T. G. Morton, of Boston, was working in the same direction, and it is to Doctor Morton that the chief honor of discovering anaesthetics is due.

He was a New England boy, who was born on a farm near Charlton, in Massachusetts. He played and worked on the farm, and went to a country school, and

later on to an academy. When he was twenty-one he went to the Baltimore College of Dental Surgery. Two years later, he graduated, and went to Boston, where for a time he was in partnership with Doctor Wells, who afterward left him and went to Hartford. He soon saw that he needed greater knowledge of the human body than he possessed, and he began to study anatomy, while at the same time he continued to experiment with one substance after another in the effort to find a good anaesthetic. At length Dr. Charles T. Jackson, a physician who was also a chemist, suggested to him that he should try sulphuric ether. He acted on the suggestion, and was so successful in his experiments that surgeons in Boston began to use it in the Massachusetts General Hospital, in 1846. Other men tried to take the credit of the discovery away from Doctor Morton, but he proved that it was his own, and after his death a monument was erected to his memory in Boston.

The fame of the discovery soon spread to Europe, and ether was used in London a little over a month after its first use in Boston. Among the surgeons who quickly saw its great value was Dr. James Simpson, one of the professors at Edinburgh University. But the methods used in giving ether were not then nearly so good as they are now, and Doctor Simpson began to look around for something, the use of which would be safer than ether.

He began to experiment, and, with two of his friends, tried many things. He worked for months without success, but at last remembered a little bottle of chloroform which a Scotch chemist had sent him. All the other things that he had received from many chemists had proved unsatisfactory, but the chloroform did the work he needed. He inhaled its odor, and immediately fell into a deep, heavy sleep. He had made a most valuable discovery, though it might have been at the cost of his own life. Physicians of to-day know the exact strength of the anaesthetics that they use, and measuring instruments have been devised so that they can tell the exact amount that it is safe to gave. But all this is the result of hard work and deep thought. The men who first of all experimented on themselves for the good of others deserve high honor for their bravery. Chloroform in particular was a little-known substance which had been discovered only in 1831 by two French chemists, and analyzed and described by Dumas, another noted French scientist, in 1835.

Doctor Simpson was born in 1811 in the little town of Bathgate, in Scotland, where his father was a baker. At the age of fourteen he went to Edinburgh University, at nineteen he had taken his degree in surgery, and was ready for his degree as doctor of medicine at the age of twenty-one.

When he found this new use for chloroform, he was already well known for his surgical skill as well as his teaching. He at once began to use chloroform in his practice and his success was so great that its use spread quickly. Surgeons and students flocked to see him perform operations, and among them was Dumas, who came to see this most important use to which chloroform had been put.

Meanwhile doctors in America continued to experiment with ether and success followed. So now there were two drugs which would destroy pain. Both are used to-day, though in the United States doctors generally prefer ether when it can be had, while chloroform is preferred in England.

Men have discovered other drugs which produce what is called local anaesthesia. This means that the nerves are prevented from conveying the sensation of pain to the brain, which itself is clear. Some of them, if sprayed upon the skin, freeze the flesh. Others simply paralyze the nerves, as cocaine and eucaine. Others are injected between the vertebrae and prevent sensation from passing along the nerves.

It was now possible for the most delicate operations to be carried out without causing pain, and cases which before had been hopeless became comparatively simple. Such men as Dr. J. Marion Sims, in America, Doctor Simpson, of whom we have just read, and many others, by their skill and knowledge saved many lives. But this brings us to another wonderful example of the way in which Nature drives us on to everlasting learning. The number of operations by surgeons increased greatly, but the number of deaths increased also. The death rate in the hospitals became appalling. For although the operations themselves were quite successful, the effects that followed were often fatal. Wounds which the surgeon's

knife had caused would not heal; scores of deaths followed from gangrene.

GREAT DISCOVERIES BY LOUIS PASTEUR AND JOSEPH LISTER

At first it seemed as if there were no help anywhere. About this time, however, a Frenchman, Louis Pasteur, of whom we read elsewhere, discovered that some of the microbes which swarm everywhere around us cause milk and wine and beer to turn sour. It was a great discovery, and set all the scientific world talking, but just one man saw what it might mean to human life.

This was Joseph Lister, a young hospital surgeon who had been looking already for the cause of the dreaded hospital gangrene. When he heard of Pasteur's discovery, he believed that it gave him the clue to the mystery. With the light that the new knowledge gave him, he began a series of experiments, and was entirely successful in preventing the havoc caused by gangrene.

The stories of the lives of these two men and of most of their well-known successors belong to the story of scientists in medicine, which you will find in another place. There are only a few men whom we must tell about here, and among them are two brothers named William James Mayo, and Charles Horace Mayo.

TWO FAMOUS AMERICAN SURGEONS OF OUR DAY

These famous brothers are the sons of a physician and were both born in the state of Minnesota during the years of the Civil War. Both decided to follow their father's profession, and each, after he took his doctor's degree, settled down in the little town of Rochester, in Minnesota, where their father lived. Like their father before them, they are skilful surgeons, and their fame has spread from their own state through all of North and South America, and to Europe.

The value of their work lies not only in their skill, but in the fact that they are great teachers. Thousands of doctors, large numbers of whom have been practising for years, go every year to the hospital at Rochester, in Minnesota. There these doctors, some of them gray-haired men, refresh their knowledge, and learn new ways, greater skill, and inspiration, from the two quiet brothers who did not seek the fame that their search for knowledge, and insistence on the right ways of doing things has brought them.

PHILIPPE PINEL, WHO BEGAN TO CARE FOR ILLNESS OF THE MIND

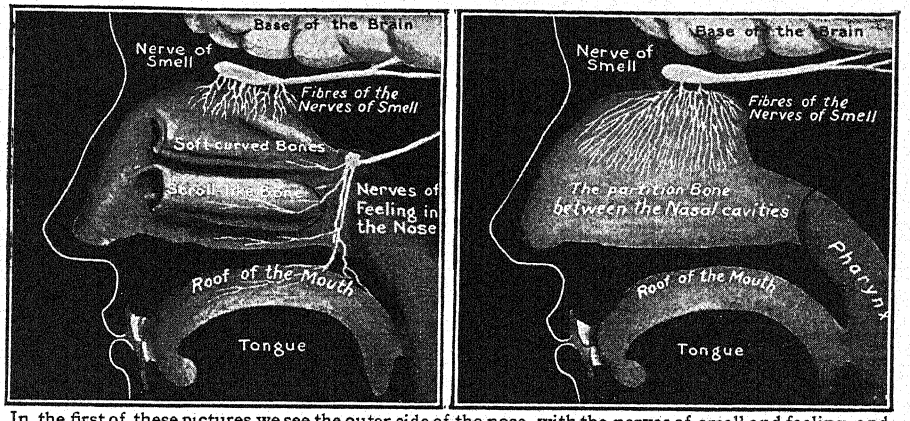
Although efforts were made from the very dawn of civilization to cure illness of the body, little was done until the last century to cure illness of the mind. The Greeks had a glimmering of the true way of caring for sick minds, but the doctors of the Middle Ages had none. If people who were afflicted with illness of the mind could not be cared for at home, they wandered about the country, or were thrown into prison and cruelly treated. Some few were cared for in monasteries and convents, especially at Gheel in Belgium, but the numbers who could be taken in were few and very little could be done for them. The general opinion was that they were very wicked people, and ought to be punished.

This was the state of affairs when, late in the eighteenth century, Dr. Philippe Pinel was appointed physician to the Salpêtrière, an institution in Paris where a large number of these afflicted people were confined. The first thing that he did was to order the chains, with which many of his poor patients were loaded, to be struck off, and with that act of kindness, the proper treatment of mental illness was begun.

Pinel, who was born at the little town of St. Andre, not far from Paris, had studied at the universities of Toulouse and Montpellier, and had already written a book setting forth his views. He continued to study and teach during his life, which ended less than a hundred years ago. His teaching inspired others to follow in his footsteps, and since his time much has been learned about mental illness. It took some time to overcome old ideas, but every care is now taken of patients who suffer from disease of the brain. Doctors give all their lives to the study of mental diseases. Sometimes it is found that an illness can be cured, or that its cause may be removed by an operation or by some special treatment, and a great deal of unhappiness is saved.

The names of the men of whom we have been reading are well known to the world. There are many other famous doctors whose names we cannot possibly give in a few pages. Besides these there are numbers who were obscure, but whose devoted service to the cause of healing helped to advance the science they loved.

THE NEXT STORY OF MEN AND WOMEN IS ON PAGE 4723.



In the first of these pictures we see the outer side of the nose, with the nerves of smell and feeling, and in the second is shown the inner part of the nose, with the dividing plate of bone between the nostrils.

SMELL AND TASTE

CONTINUED FROM 4527



SMELL and taste are two senses which are of small importance compared with hearing and vision, and we certainly need waste no time in troubling to ask how they may be taken care of; but they are, nevertheless, very interesting.

These two senses are often called the chemical senses. Unlike hearing and vision, they do not depend upon waves, whether in the ether or in the air. We only smell or taste when the thing is actually touching the parts of the body which have this power; we see and hear at a distance, so to speak, but we cannot smell or taste at a distance. When we seem to smell at a distance, particles of the thing we are smelling have been carried through the air to the nose. This fact that smell and taste are so limited in their range makes them inferior to hearing and vision.

Only a very small part of our knowledge of the world in which we live enters by these two gateways of knowledge—the senses of taste and smell. We know that these two senses are in great decline among the higher animals, and especially in mankind. While the senses of vision and hearing have become more important, the senses of taste and smell have become less so. These two senses are closely allied, and they very commonly work together. The taste of such a thing as cinnamon is very like its smell. A very large part of what we usually call taste is really smell. This is true not only of the bouquet, or aroma, of rare wines, but also of ordinary articles of diet. We can prove this for ourselves by noticing how differently our food seems to taste when the nose is thrown out of action by a bad cold.

We do not smell with the whole of our nose. Careful study with the microscope shows us exactly with what part of the nose we do smell. Roughly speaking, we may say that it is the roof of the nose and the upper third of it by which we smell.

The rest of the nose is lined by cells which have little projections that wave backwards and forwards and keep the channel clear; but the smell region of the nose is lined by special smell-cells, which correspond to the special cells that we found in the inner ear and in the retina. Each of the smell-cells is connected with a tiny nerve-fibre of its own. We find that this tiny nerve-fibre

really grows out of the smell-cell, which is therefore a nerve-cell that has become changed. This is different from the rods and cones of the retina, or from the special cells in the inner ear, because they are not changed nerve-cells. The difference probably indicates to us how very ancient the sense of smell is, dating back to a time in the history of the body long before so many different cells had been made for so many different purposes as we find nowadays.

THE TWO PAIRS OF NERVES IN THE NOSE, AND THEIR BUSINESS

The nose is supplied by two pairs of nerves coming from the brain. These two pairs of nerves are quite different in their duties. One pair has nothing to do with smell at all, but has to do with ordinary feelings in the nose. Anything tickling, or pricking, or hurting the nose affects these nerves; so does a thing like ammonia, which is irritating, besides having a smell. But this pair of nerves is not affected at all by odors that are not irritating.

The other pair of nerves that come to the nose are the nerves of smell; they are known as the first pair of nerves, because they come off from the brain in front of any others. These nerves are apt to wear out, so to speak, in old age, so that old people lose, in some degree, their sense of smell, just as they often become deaf.

As everyone knows, there is an endless number of possible smells. Naturally, we wish to try to group them in the same manner that we group tastes, but it really is very difficult to classify smells in any way that people would agree upon. A very large number of oils found in plants have rather the same sort of smell, though, perhaps, it is not very easy to recognize any particular resemblance between such smells as turpentine and lavender.

DIFFERENT KINDS OF SMELLS THAT HAVE A FAMILY LIKENESS

Still, on the whole, there is a general family likeness between the smells of plants and flowers; and, when we examine the oils that cause these smells, we find that they are related to each other in their chemical build. There are certain other groups of smells, such as the group to which carbolic acid belongs; and we can learn enough to see that there is a connection between the chemistry of a compound and its smell, but that is about all we can say. It is interesting to notice that electricity can stimulate our sense of smell as it can stimulate all our senses, and the sensation it causes is rather like the smell of phosphorus. It has also been shown that if we take a series of chemical substances which differ from one another in a regular way, their properties of smell also differ regularly.

For instance, there is a long series of chemical substances beginning with marsh-gas. This has no smell—a very unfortunate fact for miners. The next member of the marsh-gas series has a faint smell, and farther on in the list the smells become very strong. It is also noticed that the things which have the most smell are the things, as a rule, which weigh heaviest.

Late last century, Sir William Ramsay, an English scientist advanced a theory about smell, which is probably nearer the truth than anything else we can say. He thought that the power of exciting smell increases with the size of the molecules of a substance, provided, of course, that it is a liquid, or a gas, and not solid. Hydrogen, oxygen, and nitrogen have no smell, probably because their molecules are too small.

WHAT SMELL DEPENDS UPON AND WHAT TASTE DOES NOT DEPEND UPON

The first member of the series of alcohols has no smell; the next, which has a larger molecule, has a faint smell; and the still heavier alcohols have very decided smells. All this is very far from fully explaining to us what happens when we smell.

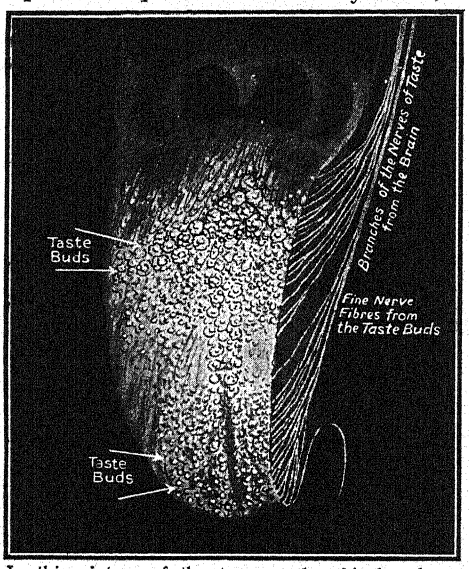
It is interesting to notice that sneezing cannot be excited through the nerves of smell, though it can be excited through the nerves of ordinary feeling in the nose, and through the nerves of sight. Lastly, it is noticed in the case of all the senses, more or less, that they are aroused by *differences* outside them, and soon take much less notice, so to speak, of what excited them very much at first, if it remains the same. This is more striking, perhaps, in the case of smell than in that of any other sense. We have all noticed how quickly we cease to be aware of a smell which at first was perhaps very unpleasant.

The sense of taste resides mainly in the tongue, but does not depend alone

on the tongue. The special cells which are concerned with it, corresponding to the special cells found in the organs of the other senses, may also be discovered on the lower surface of the soft palate, and scattered over part of the throat in front of the tonsils on each side. A person who has lost his tongue does not entirely lose his sense of taste.

As in other cases, special nerve-fibres run to the cells of taste, which are most rich on the back part of the tongue, along the upper part of the edge of the tongue, and at its tip. Taste is much less acute on the front part of the surface of the tongue. We can notice this especially if we place a quinine powder there and then swallow it.

Tastes can be classified much better than smells. Most of them come under the headings of bitter, sweet, acid, alkaline, and salt. The last three of these are probably not pure tastes, but mixtures of taste and ordinary feeling, so they can become painful when they are very strong. But bitter and sweet are probably pure tastes, and, however strong, and perhaps unpleasant, they can never cause such pain as the others do.



In this picture of the tongue, the side has been removed to show how the nerves run from the sense organs, or buds of taste, to the brain. The taste buds are grouped at the back and tip of the tongue.

If things are to be tasted, they must be dissolved in a liquid. We do not taste solids, and we do not taste gases, unless they are dissolved in water or some other liquid.

With great labor and difficulty, the nerve-fibres that have to do with taste have been traced from the tongue, palate, and throat to the brain. The curious thing is that there are not separate nerves of taste as there are nerves of smell, vision, and hearing; but the special nerve-fibres of taste run along in other nerves which have nothing to do with taste, and they do so in a most extraordinarily complicated way. We do not yet know what the meaning of this is, but it is evident that in the history of evolution there must have been a very large number of shiftings and changings in the arrangements that have to do with taste. It is certain that, on the whole, both these chemical senses have great uses, far beyond merely being able to let us distinguish between one thing and another. On the whole, they indicate what is harmless or good for us, and teach us what we ought to avoid. There is no doubt about this as regards the sense of smell. Much more important really is the case of taste, which has so much to do with what we eat and what we refuse to eat. It is probable that the sense of taste of a healthy child, rightly brought up, is the best guide as to what it should, or should not, eat.

There are many things which children, or grown-up people if they have not had them before, find unpleasant. We have to make, or acquire, the taste for them, and so we speak of "acquired tastes." It is often true of tomatoes, which few people like naturally. Some of these things may not be harmful, because it may be possible for the body to learn in time how to protect itself from them. But it is possible that no taste is worth acquiring, and that most grown-up people would be healthier if their tastes were more nearly what they were in child hood.

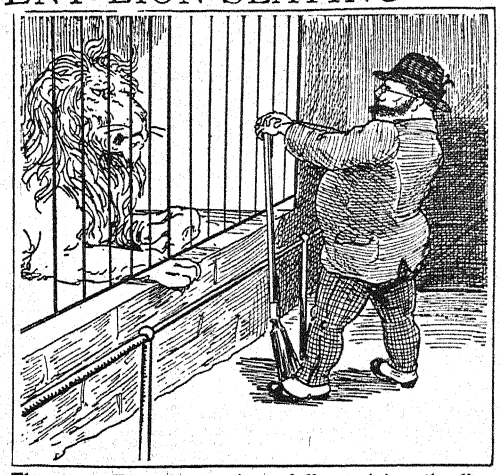
We have now come to the end of that part of our subject which deals with the body, and we have finished by discussing certain well-known facts about the body which are also facts about the mind. Let us now, instead of thinking of one sense at a time, think of the senses as a whole, and then we shall find that this place where we have ended the study of the body is the right place for the beginning of the study of the mind.

THE NEXT PART OF THIS IS ON PAGE 4747.

HOW TARTARIN WENT LION-SLAYING



Tartarin was king of the cap-hunters; he always had a hopeless rag of a cap at the end of a day's sport.



The great Tartarin stood carefully studying the lion from the Atlas Mountains, which sniffed and growled.



About ten o'clock the hero issued forth. "He's a Turk! He's wearing spectacles!" cried the excited beholders.



It would have been better for Tartarin to have faced a lion than this angry old lady with the umbrella.



Tartarin's pride speedily had a fall, for he found the movement of the camel worse than that of the boat.



He was received with loud shouts of "Long live Tartarin!" "Three cheers for the lion-slayer!"

A MASTERPIECE OF HUMOR

"TARTARIN OF TARASCON" is one of the merriest tales of the nineteenth century. It was written in 1872 by Alphonse Daudet, the famous French novelist, and made all Europe laugh. Tarascon is a real town in the south of France, and people of that district have a habit of bragging and boasting; telling "tall stories," as we Americans say. It was to make fun of this that Daudet wrote his delightful extravaganza, and a better comic tale has not been written in modern times. He makes us laugh at the absurd lion-hunter, yet keeps a corner for him in our affections, for he never lets us be bored by his Tartarin, or grow out of temper with him. And this means that "Tartarin of Tarascon" is a work of true humor. The further adventures of his hero are the subjects of two more stories, "Tartarin in the Alps" and "Port Tarascon," which well deserve to be read when we have learned enough French to enjoy them.

TARTARIN OF TARASCON

CONTINUED FROM 4439

I REMEMBER my first visit to Tartarin of Tarascon as clearly as if it had been yesterday, though it is now more than a dozen years ago. He then lived in the third house on the left as you enter the town on the Avignon road. It was a pretty little villa, like many others in Tarascon, with a delightful little garden plot in front, a balcony behind, and its walls so whitely painted that they glittered like a mirror in the bright southern sunshine. The Venetian shutters were of bright green; but really there was nothing remarkable about the outside of the house. Inside, it was a very different story.

When you had passed into the garden at the back, you would never have fancied you were in old France. Every tree and plant had been brought from foreign lands; he was such a tremendous fellow for collecting the curiosities of Nature, this wonderful Tartarin. His garden boasted, for instance, an example of the baobab-tree, the most gigantic of all trees in the world, but Tartarin's specimen was only big enough to occupy a mignonette pot. He was mightily proud of it, all the same.

The great sight of his place, however, was the hero's private den at the bottom of the garden. Picture to yourself a large hall gleaming from top to bottom with firearms and weapons of all sorts, gathered from every clime: carbines, rifles, blunderbusses, bowie-knives, revolvers, daggers, flint-arrows—in a word, examples of the deadly weapons of all races used by man in all parts of the world. Everything was wonderfully and neatly arranged, and labeled as if it were in a public museum. "Poisoned Arrows. Please do not touch!" was the warning on one of the cards. "Weapons loaded. Have a care!" greeted you from another. My word, it required some pluck to move about in the den of the great Tartarin.

There were books of travel and adventure, books about mighty hunting, on the table in the centre of the room, and seated at the table was a short and rather fat, red-haired fellow of about forty-five years, with a closely-trimmed beard and a pair of bright eyes. He was in his shirt-sleeves. He was reading a book held in one hand while he gesticulated wildly with a large pipe held in the other. He was evidently imagining himself the daring hero of the story. This jolly-looking fellow was the great Tartarin of Tarascon, the intrepid, the incomparable Tartarin!

Now, at the time of which I speak, Tartarin had not risen to the great fame of his later years. He was certainly a man of note in Tarascon, but he had still to become the most famous man in all the south of

France. The people of Tarascon were tremendously fond of hunting, and Tartarin was the chief of the hunters. You may think this funny when you know there was not a living thing to shoot at within miles of Tarascon; scarcely a sparrow to attract local sportsmen. Ah, but you don't know how ingenious they are down there.

A DAY WITH THE GALLANT "CAP-HUNTERS" OF TARASCON

Every Sunday morning off the huntsmen sallied with their guns and ammunition, the hounds yelping at their heels. In the evening they came back well satisfied with their day's sport. And this is how they made up for the lack of game. Each man as he left in the morning took with him a brand new cap, and when they got well into the country and were ready for sport, they took their caps off, threw them high in the air, and shot at them as they fell. In the evening you would see them returning with their riddled caps stuck on the points of their guns, and of all these brave men Tartarin was the most admired, as he always swung into town with the most hopeless rag of a cap at the end of a day's sport.

There was nothing about wild beasts and hunting that Tartarin had not read, and there was absolutely nothing about them that he knew from actual experience. But it was enough for his friends of Tarascon that he was king of the cap-shooters, and you could see him any night sitting in the shop of Costecalde, the gunsmith, giving forth his opinions on the chase to an admiring audience of fellow-townsmen.

TARTARIN AS A MUSICIAN, AND THE FUNNY DUET

The people of Tarascon, in addition to this strange craze for the chase, are great lovers of sentimental songs, as we might expect from descendants of the old troubadours. Every family has its own favorite song. Bezuquet, the chemist, for instance, pins his faith to that beginning: "Oh, thou fair star, whom I adore!" Tartarin also fancied he could sing, but his vigorous bellowing was enough to make the old troubadours turn in their graves. Madame Bezuquet would induce him to take part in a duet in which all he had to do was to sing "No, no, no!" every few lines, and this he did with such superfluous energy that he had to wipe the perspiration from his face at the end of it. Feeling quite happy, however, he would drop into his club later on and say in an offhand way:

"I have just come from the Bezuquets', where they would have me sing in the duet from 'Robert le Diable.'" But the funniest part of it was he really believed he had been singing in a duet.

You can readily see how such a good-natured fellow was popular with everybody. All the soldiers quartered in Tarascon were for Tartarin to a man. The legal authorities and the common people equaly admired his noble swagger. Surely there never was such a tremendous fellow, and yet withal he was not happy. He felt that he was capable of greater achievements than he had scope for in Tarascon.

His imagination had been so fired by reading the stories of brigands and pirates and Red Indians, to say nothing of big-game hunting, that he had come to be continually on the look-out for adventure, even when he walked about his own little town.

HOW THE GREAT MAN THIRSTED FOR SOME EXCITING ADVENTURE

Before leaving his villa to proceed to his club, he used regularly to practise with swords and pistols, so that he might be prepared if "they"—which stands for pirates, brigands, or anything of that sort—should attack him. He even chose the longest and darkest road to his club to prove how fearless he was, how little he cared for danger. But every night it was the same; after looking all the way and lingering outside the door in the hope of some adventure, he would at last go into his club murmuring: "Nothing! Nothing! always nothing!" and spend the evening playing cards.

Despite all his thirst for travel and adventure, Tartarin had never been farther than Beaucaire. Beaucaire is not very far from Tarascon. It is a town on the other side of the River Rhône, and it is connected with Tarascon by means of a bridge. But the bridge had often been swept away by storms, and in Tartarin's time it was so long and so rickety that—zounds! well, you understand. . . . Tartarin preferred to have a grip of the ground. You see, for all his adventurous spirit, he had a certain amount of caution. There were really two men in Tartarin. The one Tartarin said to him: "Cover yourself with glory." The other Tar-

tarin said to him: "Cover yourself with flannel." The one Tartarin, imagining himself fighting Indians, would call for "An axe! An axe! Somebody give me an axe!" The other Tartarin, knowing that he was cosy by his fireside, would ring the bell and say: "Jane, my coffee." Tartarin was really Don Quixote and Sancho Panza rolled into one. And that is why he had not yet ventured away from Tarascon.

TARTARIN'S IMAGINARY VOYAGE TO THE FAR EAST

Once, however, he just missed going on a great voyage to Shanghai. In fact, he nearly went, and people talked so much about his intention to go that after a time it seemed as if he had gone, and he himself began to believe he had actually been at Shanghai. People in fun would ask him what life was like out there, and he would tell them quite frankly, describing the raids of the Tartars.

"Then I put my men under arms," Tartarin would explain for the hundredth time, "ran up the consular flag, and—slap! bang! from the windows on the Tartars."

Really, you may think that Tartarin told lies, but it was not so. The fact is, the sun is so strong in the south of France, and particularly at Tarascon, that it seems to magnify everything, and raises in the minds of the imaginative people visions of things they would like to do, and have never done, but in time begin to believe they have done.

THE COMING OF THE LION TO TARASCON AND WHAT IT LED TO

But a time was to come at last when Tartarin was to find adventure. One evening at the gunsmith's, when the hero was explaining some mechanism of the rifle, the door was opened and an excited voice announced: "A lion! A lion!" The news seemed incredible, but you can imagine the terror that seized the little group in the gunsmith's, as they asked for more news. It appeared that the lion was to be seen in a traveling menagerie that had arrived from Beaucaire. Never had such a thing been known in Tarascon, and Tartarin's fellow cap-hunters began to think they had here an opportunity. The great man himself was lost in thought. A lion at last, and here in Tarascon! Suddenly, when the full truth had dawned upon him, he shouldered his gun, and, turning to Major Bravida, "Let us go to see him!" he thundered. Following him went the cap-hunters. Arrived at the menagerie, where many Tarasconians were already wandering from cage to cage, Tartarin entered with his rifle over his shoulder to make inquiries about the king of beasts. His entrance was rather a wet blanket to the spirits of the other visitors, who, seeing their hero thus armed, thought there might be danger, and were about to flee. But the proud bearing of the great man reassured them, and Tartarin continued his round of the booth until he faced the lion from the Atlas Mountains.

Here he stood carefully studying the creature, who sniffed and growled in surly temper, and then, rising, shook his mane and gave vent to a terrible roar, directed full at Tartarin. At this, most of the visitors made a rush for the door, women screaming, children tumbling over each other. Even the brave Bravida made a move away.

TARTARIN FACES THE KING OF BEASTS AND MAKES A MEMORABLE REMARK

Tartarin alone stood his ground, stern and immovable, in front of the cage, and the valiant cap-hunters, somewhat reassured by the bravery of their leader, again drew near and heard him murmur, as he gazed on the lion: "Ah, yes, there's a hunt for you!"

Not another word did Tartarin utter that day. Yet next day nothing was spoken about in the town but his intention to be off to Algeria to hunt the lions of the Atlas Mountains. When asked if this were true, his pride did not let him deny it, and he pretended that it might be true. So the notion grew, until that night at his club Tartarin announced, amid tremendous cheering, that he was sick of cap-hunting, and meant very soon to set forth in pursuit of the lions of the Atlas.

Now began a great struggle between the two Tartarins already described. While the one was strongly in favor of the adventure, the other was strongly opposed to leaving his snug little house and the safety of Tarascon. But he had let himself in for this, and felt he would have to do it. So he began reading up books of African travel, and found from these how some of the explorers had trained themselves for the work by enduring hunger, thirst, and other

privations before they set out. Tartarin began cutting down his food, taking very watery soup. Early in the morning, too, he walked round the town seven or eight times, and at night he would stay in the garden from ten till eleven o'clock, alone with his gun, to inure himself to night chills; while so long as the menagerie remained in Tarascon a strange figure might have been seen in the dark prowling around the tent, listening to the growling of the lion. This was Tartarin, accustoming himself to be calm when the king of beasts was raging.

There had never been such a time in Tarascon as the period of preparation for Tartarin's great journey. It was the sole subject of conversation; everybody talked about the hero, and what he might do, and whether he would really go, or if it were only to be another visit to Shanghai!

THE HERO GROWS FAINT-HEARTED, BUT IS URGED TO HIS GREAT TASK

The feeling began to grow that the Tartarin who believed in covering himself with flannel was going to get the upper hand of the Tartarin who wanted to cover himself with glory. The hero was clearly shirking. He showed no haste to be off. The soldiers were the only people in the town who still believed in him, and one night Major Bravida went to Baobab Villa and said very solemnly: "Tartarin, you must go!"

It was a terrible moment for Tartarin, but he realized the solemnity of the words, and, looking around his cosy little den with a moist eye, he replied at length, in a choking voice: "Bravida, I shall go!" Having made this final decision, he pushed ahead his final preparations with some show of haste. From Bompard's he had two large trunks, one inscribed with "Tartarin of Tarascon. Case of Arms." From Bezuquet he bought a portable medicine-chest, and he sent to Marseilles for all sorts of provisions of travel, including a patent camp-tent of the latest style.

Then the great day of his departure arrived. All the town was agog. The neighborhood of Baobab House was crammed with spectators. About ten o'clock the bold hero issued forth.

"He's a Turk! He's wearing spectacles!" This was the astonished cry of the beholders, and it was true, for Tartarin had thought it his duty to don Algerian costume because he was going to Algeria. He also carried two heavy rifles, one on each shoulder, a huge hunting-knife at his waist, and a revolver in a leather case. In addition to all this a pair of large blue spectacles were worn by him, for the sun in Algeria is terribly strong.

THE DEPARTURE FOR THE GREAT LION-HUNTING EXPEDITION

Making his way through the crowd, accompanied by some of his most valiant friends, he reached the railway station and ascended the many steps which lead up to the platform from the road below. The doors of the waiting-room had to be closed to keep the crowd out while the great man took leave of his friends, making promises to each, and jotting down notes on his tablets of the various people to whom he would send lion-skins. Then the train came in, and had almost left again before the strangely-dressed hero had time to jump into a carriage full of Parisian ladies, whom he nearly frightened to death with his rifles and other deadly weapons.

The wonderful town of Marseilles was less surprised at the grotesque figure of Tartarin, with his guns over his shoulders, than he was with the town. The mistral, the great wind that blows along the Mediterranean, was in full vigor when he embarked for the land of the lions, and he thought it a happy augury, as though the spirits of the air were trumpeting a triumphant farewell to the hero of France.

HOW TARTARIN BEHAVED ON HIS VOYAGE ACROSS THE MEDITERRANEAN

Oh that I had the brush of an artist, that I might paint you some pictures of Tartarin of Tarascon during his three days aboard the "Zouave" on the voyage to Algeria! But I have no facility with the brush, and mere words cannot convey how Tartarin passed from the proudly heroic to the hopelessly miserable in the course of the journey. Worst of all, when lying in his bunk, robbed of all his glory by sea-sickness, he had to listen to Tartarin of the flannel saying to Tartarin of the glory:

"This serves you right, you silly old chap! Didn't I tell you what it would be? But you would go to Africa! Oh, yes, you would insist on going to hunt lions! Now here you are, and how are you enjoying yourself?"

Still worse was it for him to know, while he was groaning in his stuffy bunk, that a very merry party of passengers were enjoying themselves in the saloon. He was still in his berth when the ship came to her moorings at Algiers, and he got up with a sudden jerk, under the impression that the "Zouave" was sinking. Seizing his many weapons, he rushed on deck, to find it was not foundering, but only arriving.

THE LION-HUNTER'S LITTLE MISTAKE ABOUT THE ALGERIAN PIRATES

Under the bluest of blue skies lay Algiers the Fair, formerly the haunt of pirates, and still infested with the most desperate sea-rovers, to the heated imagination of Tartarin, who shouted: "To arms!" when the villainous-looking porters boarded the vessel, as he thought they were the pirates. Soon after Tartarin had set foot on shore, following a great negro porter, he was almost stupefied by the babel of tongues; but, fortunately, a policeman took him in hand and had him directed, together with his enormous collection of baggage, to the European Hotel. What surprised him most about the town, which he expected would be a real Arabian Nights city, was to find it just like Tarascon, with its cafés and its restaurants and French names everywhere.

On his arrival at the hotel, he was so very fatigued that his marvelous collection of weapons had to be taken from him, and he had to be carried to bed, where he snored very soundly until it was striking three o'clock next day. He had slept all the evening, through the night and morning, and well into the next afternoon!

TARTARIN IN LION-LAND AT LAST, AND HIS FIRST EXPLOIT

He awakened refreshed, and the first thought in his mind was: "I'm in Lion-land at last!" But he thought of this with a cold shiver, and dived under the bedclothes. A moment later he determined to be up. Exclaiming: "Now for the lions!" he jumped on the floor and began his preparations.

His plan was to go out at once into the country, take ambush for the night, shoot the first lion that came along, and then back to the hotel for breakfast. So he went off, carrying not only his usual arsenal, but the marvelous patent tent strapped to his back. He attracted no little attention as he trudged along, and when he caught sight of a very fine camel, his heart beat fast, for he thought that the lions could not be very distant now.

It was quite dark by the time he had got only a little way beyond the outskirts of the town, scrambling over ditches and bramble-hedges. After much hard work of this kind, the mighty hunter suddenly stopped, whispering to himself: "I seem to smell a lion hereabouts." He sniffed keenly in all directions. To his excited imagination, it seemed a likely place for a lion; so, dropping on one knee, and laying one of his guns in front of him, he waited.

He waited very patiently. One hour, two hours; but nothing stirred. Then he suddenly remembered that great lion-hunters take a little young goat with them to attract the lion by its bleating. Having forgotten to supply himself with one, Tartarin conceived the happy idea of bleating like a goat. He started softly, calling: "Meh, meh!" He was really afraid that a lion might hear him, but as no lion seemed to be paying attention he became bolder in his "mehs," until the noise he made was like the bellowing of a bull.

THE GREAT ADVENTURE IN A SUBURBAN KITCHEN GARDEN

But hush! What was that? A huge black object had for the moment loomed up against the dark blue sky. It stooped, sniffing the ground; then seemed to move away again, only to return suddenly. It must be the lion at last; so, taking a steady aim, bang went the gun of Tartarin, and a terrible howling came in response. Clearly his shot had told; the wounded lion had made off. He would now wait for the female to appear, as his books had taught him.

But two or more hours passed, and she did not come; and the ground was damp, and the night air cold, so the hunter thought he would camp for the night. After much struggling, he could not get his patent tent to open. Finally, he threw it on the ground in a rage and lay on the top of it. Thus he slept until the bugles in the barracks near by wakened him in the morning. For, behold, instead of finding himself out on the Sahara, he was in the kitchen garden of a suburban Algerian!

"These people are mad," he growled

to himself, "to plant their artichokes where lions are roaming about. Surely I have not been dreaming. Lions do come here; there's proof positive."

Following from artichoke to artichoke, from field to field, he followed the thin trail of blood, and came at length to a poor little donkey he had wounded!

Tartarin's first feeling was one of vexation. There is such a difference between a lion and an ass, and the poor little creature looked so innocent. The great hunter knelt down and tried to staunch the donkey's wounds, and it seemed grateful to him, for it feebly flapped its long ears two or three times before it lay still for ever.

Suddenly a voice was heard calling: "Noiraud! Noiraud!" It was "the female." She came in the form of an old French woman with a large red umbrella, and it would have been better for Tartarin to have faced a female lion than this very angry old lady.

TARTARIN "GOES SOUTH" AFTER MISTAKING A DONKEY FOR A LION

When the unhappy man tried to explain how he had mistaken her little donkey for a lion, she thought he was making fun of her, and belabored him with her umbrella. When her husband came on the scene, the matter was soon adjusted by Tartarin agreeing to pay 200 francs for the damage he had done, the price of the donkey being really something like ten or twelve francs. The donkey-owner was the innkeeper, and the sight of Tartarin's money made him quite friendly, so that he invited the lion-hunter to have some food at the inn with him before he left. And as they walked thither Tartarin was amazed to be told by the innkeeper that he had not seen a lion there in twenty years!

Clearly, the lions were to be looked for farther south. "I'll make tracks for the south, too," said Tartarin to himself. But he first of all returned to his hotel in an omnibus. Think of it! This distinguished hunter, dressed like a Turk, with his guns, revolvers, and knives, to say nothing of his tent, going back to town on the top of an omnibus! But before he went south on the high adventure, he loafed about the city of Algiers for some time, going to the theatres and other places of amusement, where he met a man who called himself Prince Gregory of Montenegro, with whom he made friends. The fact was, poor old Tartarin had been stricken with love for one of the veiled Moorish women of Algiers, whom he had first seen on the omnibus, and he was hanging about the town in the hope of meeting her again. The prince kindly undertook to find her for him, and set about it at once.

IN LOVE WITH A MOORISH LADY AND FRIENDS WITH A PRINCE

Very soon he pretended he had found her, and all would be well if Tartarin would write a letter to her, which the prince would deliver. Meanwhile, he had to buy an enormous number of pipes to send her, as he was told she was a great smoker, like all Moorish ladies.

At last a meeting was arranged, and the prince accompanied Tartarin to the house of the lady, who received him sitting on her divan in true oriental fashion, smoking her hookah. Tartarin was greatly delighted to meet the lady. She entertained him by dancing and playing on the guitar. Still, he doubted whether she really was the unknown fair one of the omnibus. He was so delighted to visit her that he might never have gone southward after the lions had not the captain of the "Zouave" come across him in Algiers one day, and hinted that the prince and the lady were making a fool of him. In addition, Tartarin happened to read a note from Tarascon in a newspaper which the captain had with him, and there it spoke of the uncertainty that prevailed as to the fate of the great hunter, winding up with this paragraph:

"Some negro traders state, however, that they met in the open desert a European whose description answers to that of Tartarin, and who was making tracks for Timbuctoo. May Heaven guard for us our hero!"

THE FIRST LION THAT TARTARIN MET IN ALGERIA

Tartarin went red and white by turns as he read this, and realized that he was in for it. He very much wished to return to his beloved Tarascon, but to go there without having shot some lions—one at least—was impossible, and so it was Southward ho!

He was keenly disappointed, after a very long journey in the stage-coach, to be told that there was not a lion left in all Algeria, though a few panthers might

still be found worth shooting. He got out at the town of Milianah, and let the coach go on, as he thought he might as well take things easily if, after all, there were no lions to be shot. But, to his amazement, he came across a real live lion at the door of a café.

"What made them say there were no more lions?" he cried, astounded at the sight. The lion lifted in its huge mouth a wooden bowl from the pavement, and a passing Arab threw a copper in the bowl, at which the lion wagged its tail. Suddenly the truth occurred to Tartarin. Here was a poor, blind, tame lion, which a couple of negroes were taking through the streets, just like a performing dog. His blood was up at the very idea. Shouting: "You scoundrels, to humiliate these noble beasts so!" he rushed and took the degrading bowl from the royal jaws of the lion. This led to a quarrel with the negroes, at the height of which Prince Gregory of Montenegro came upon the scene.

TARTARIN AS A CAMEL-RIDER IS NOT A SUCCESS

The prince told him a most untrue story about a convent in the north of Africa where lions were kept, to be sent out with priests to beg for money. He also assured him that there were lots of lions in Algeria, and that he would join him in his hunt.

Thus it was in the company of the so-called Prince Gregory, and with a following of half a dozen negro porters, that Tartarin set off early next morning for the Shereef Plain; but they very soon had trouble, both with the porters and with the provisions Tartarin had brought for his great journey. The prince suggested dismissing the negroes and buying a couple of donkeys, but Tartarin could not bear the thought of donkeys, for a reason with which we are acquainted. He readily agreed, however, to the purchase of a camel, and when he was safely helped up on its hump, he sorely wished the people of Tarascon could see him. But his pride speedily had a fall, for he found the movement of the camel worse than that of the boat in crossing the Mediterranean. For the remainder of their expedition, which lasted nearly a month, Tartarin preferred to walk on foot and lead the camel.

From village to village they went, the prince always telling Tartarin wonderful stories of the lions that might be met, but never a sign of a lion was seen. One night, in the desert, however, Tartarin was sure he heard sounds just like those he had studied at the back of the traveling menagerie at Tarascon. He was positive they were in the neighborhood of a lion at last. He prepared to go forward to stalk the beast. The prince offered to accompany him, but Tartarin resolutely refused. He would meet the king of beasts alone!

THE HERO GOES FORTH ALONE TO SLAY THE ROARING LION

He entrusted his pocket-book, full of precious documents and banknotes, to his pretended friend, in case he might lose it in a tussle with the lion, and so moved forward. His teeth were chattering in his head, and his rifle was rattling on the hilt of his hunting-knife, when he lay down, trembling, to await the lion.

It must have been nearly two hours before he was sure that the beast was moving quite near him in the dry bed of a river. Firing two shots into the darkness in the direction whence the sound came, he got up and bolted back to where he had left the camel and the prince—but there was only the camel there now! The dishonest impostor had waited a whole month for this chance to make off with Tartarin's money.

In the morning the truth dawned slowly upon him that he had been robbed by a thief who pretended to be a prince. And here he was in the heart of savage Africa with a little pocket-money only, much useless luggage, a camel, and not a single lion-skin to show for all his trouble.

Sitting on one of the desert-tombs erected over pious Mohammedans, the great man began to weep bitterly. But even as he wept the bushes were pushed aside a little in front of him, and a huge lion presented itself.

A LION AT LAST, AND HOW TARTARIN NEARLY BLEW IT TO PIECES

It advanced towards him, howling terribly. To his honor, be it said, Tartarin never moved a muscle, but, breathing a fervent "At last!" he leaped to his feet, and, leveling his rifle, planted two explosive bullets in the lion's head. All was over in a moment, for he had nearly blown the king of beasts to pieces! But in another moment he saw two tall, enraged negroes bearing down upon him with their cudgels. He had seen them

before at Milianah, and this was their poor, blind lion! Fortunately for Tartarin, he was not so deeply in the desert as he had thought, but was merely outside the town of Orleansville, and a policeman from that place now came up, attracted by the firing, and took full particulars.

The upshot of it was that he had to suffer much delay in Orleansville, and was eventually fined the sum of 2,500 francs. How to pay this was a problem which he was only able to solve by selling his weapons and all his extensive outfit, bit by bit, to different buyers. When his debts were paid, he had nothing but the lion's skin and the camel. The former he despatched to Major Bravida at Tarascon, and the camel he intended to try to sell in order to pay his coach fare back to Algiers. But nobody would buy the poor creature, and its master had to face all the journey in short stages on foot.

THE AFFECTIONATE CAMEL THAT STOOD BY ITS MASTER

The camel showed a curious affection for him, and followed him as faithfully as a dog. When, at the end of eight days' weary tramping, he came at last to Algiers, he did all he could to lose the animal, and hoped he had succeeded. He met the captain of the "Zouave," who told him that all Algiers had been laughing at the story of how he had killed the blind lion, and he offered Tartarin a free passage home.

The "Zouave" was getting up steam next day, as the dejected Tartarin, no longer the owner of splendid weapons, or needing portage for his luggage, but so destitute that his hands were all he had in his pockets, had just stepped into the captain's long-boat, when, lo! his faithful camel, which had been hunting for him for the last twenty-four hours, came tearing down to the quay and gazed affectionately at its friend. Tartarin pretended not to notice it; but the animal seemed to implore him with his eyes to be taken away. "You are the last Turk," it seemed to say, "I am the last camel. Let us never part again, O my Tartarin!"

But the lion-hunter pretended to know nothing of this ship of the desert.

As the boat pulled off to the "Zouave," the camel jumped into the water and swam after it, and was taken aboard. Tartarin spent the return voyage in his state-room, not because of the rough weather this time, but because he could not venture on deck without being worried by the camel. At last, however, our hero had the joy of hearing the "Zouave" cast anchor at Marseilles, and, having no luggage to trouble him, he rushed off the boat at once and hastened through the town to the railway station, hoping to get ahead of the camel.

HOW THE CAMEL HELD ITS OWN WITH THE TRAIN AND GOT TO TARASCON

He booked third class, and quickly hid himself in a carriage. Off went the train. All was well, he thought. But the train had not gone far when everybody was looking out of the windows and laughing. Behind the train ran the camel—he was holding his own, too!

What a humiliating home-coming! All his weapons of the chase left on Moorish soil, not a lion with him, nothing but a stupid camel!

"Tarascon! Tarascon!" shouted the porters as the train slowed up at the station, and our hero got out. He had hoped to slink home unobserved; but, to his amazement, he was received with shouts of "Long live Tartarin!" "Three cheers for the lion-slayer!" The people waved their caps in the air; it was no joke, they were serious. There was the brave Major Bravida, and there the more noteworthy cap-hunters, who clustered round their chief and carried him in triumph down the stairs.

THE HAPPY RESULT OF SENDING HOME A LION'S SKIN

Now, all this was the result of sending home the skin of the blind lion. Isn't it wonderful what a skin can do for one? But the climax was reached when, following the crowd down the stairs of the station, limping from his long run, came the camel. Even this Tartarin was happily able to turn to good account. He reassured his fellow-citizens, patting the camel's hump:

"This is my camel; a noble beast! It has seen me kill all my lions."

And so, linking his arm with the worthy major, he calmly wended his way to Baobab House, amid the ringing cheers of the populace. On the road he began a recital of his great hunts.

"Picture to yourself," he said, "a certain evening in the open Sahara——"

THE NEXT FAMOUS BOOKS ARE ON PAGE 4751.

A POEM OF PATRIOTISM

THIS strong poem by Charles Sangster (1822–93), a Canadian author and journalist of the last generation, strikes a high note of patriotism. Though Canada lacks the legends and tales of the old world, the vigorous young nation has the material for literature in its abounding national life. The eyes of Canadians are on the future rather than on the past, and to the work of building a great nation in a great land their chief energies are now directed. Appreciation of their own country, and the belief in its future distinguish much Canadian poetry of the present. Though the early days are remembered with tender sympathy, Canadians believe that the best is yet to be. The other poems by Canadian authors included in this section show a considerable range of thought and feeling.

OUR NORLAND

CONTINUED FROM 4522

WE have no Dryads in our woods,
No Fairies in the hills,
No Nereids in the crystal floods,
Nor Undines in the rills;
No jolly Satyrs such as he,
The gentle Spenser, found
In that rare Dream of Chivalry
With which his muse is crowned:

No sacred Fawns, no Druid oaks,
No Sylvan deities,
No Ouphs to hold along the brooks
Their midnight revelries;
No Ogres, guarding castle-keeps,
No Witches wild and lean,
No crafty Sirens from the deeps,
No Genii from the green:

No mellow-throated nightingales
Rousing the wilds with song,
While Echo waits through all the vales
The sweet notes to prolong;
No larks, at heaven's coral gate,
To celebrate the day
In fiery strains, and passionate
Outbursts of lyric lay.

But we have birds of plumage bright,
And warblers in our woods,
Whose hearts are well-springs of delight,
Whose haunts, the solitudes—
The dim, untrodden wilderness,
Where wildness reigns supreme—
God's solemn temple none the less
Than some romantic dream;

Vast ev'n beyond the thought of man,
Magnificently grand;
Coeval with the first great plan
From Nature's artist-hand:
Deep within deep, and wild on wild,
In savage roughness rolled,
Grandeur on grandeur heaped and piled
Through lusty days of old:

The stern-browed cape, the lofty peak
Round which the mists are curled,
Whence Fancy not in vain might seek
The circle of the world:
Broad inland seas and lovely lakes
Their tributes seaward pour
O'er cataracts, whose thunder shakes
The granite-belted shore:

The rugged oak, the regal pine,
Our woodland monarchs, these,
Whose strong arms nursed the circling vine
Through countless centuries;
Their reign was from the days of eld,
Their hosts were mighty peers,
Who fought and fell as time compelled
The battle of the years.

We have no feudal castles old,
Like eyries perched on high,
Whence issue knights or barons bold,
To ravage and destroy;
But we've the remnant of a race
As bold and brave as they,
Whether in battle or the chase—
The Red Man of to-day.

How brave—how great—in days of yore,
Their scanty legends tell;
The soul a-hungered craves for more,
But lo! beneath the swell
Of Time's resistless, onward roll,
The unwritten secrets lie,
No voice from out the distant goal,
No answer but a sigh.

For Time, like some old miser, keeps
The record of the Tribes,
And will not yield it from the deeps
For promises or bribes.
What mighty Chiefs! what Sachems gray!
What multitudes of Braves!
But what remains of those to-day?
A continent of graves!

And in their stead the Old World pours
Its streams of living men—
Its hearts of oak, along our shores
To people hill and glen;
To battle through a nation's youth
Until, by heaven's grace,
We rise, in freedom and in truth,
Another British race.

Stand up, then, in thy youthful pride,
O nation yet to be,
And wed this great land to its bride,
The broad Atlantic Sea;
Fling out Britannia's flag above
Our heaven-born endeavour,
Our chain of waves, one chain of love,
Uniting us for ever.

JACQUES CARTIER

The celebrated French navigator, Jacques Cartier, was the first European to explore the waters of Canada. He spent a winter there and gave Mount Royal and the Bay of St. Lawrence their names. Thomas D'Arcy McGee, an Irish-Canadian poet and politician, in this poem gives us the picture of Cartier's departure on his second voyage and of his safe return.

IN the seaport of St. Malo, 'twas a smiling morn in May,
When the Commodore Jacques Cartier to the westward sailed away;
In the crowded old Cathedral all the town were on their knees,
For the safe return of kinsmen from the undiscovered seas;
And every autumn blast that swept o'er pinnacle and pier,
Filled manly hearts with sorrow, and gentle hearts with fear.

A year passed o'er St. Malo—again came round the day
When the Commodore Jacques Cartier to the westward sailed away;
But no tidings from the absent had come the way they went,
And tearful were the vigils that many a maiden spent;
And manly hearts were filled with gloom, and gentle hearts with tear,
When no tidings came from Cartier at the closing of the year.

But the earth is as the future, it hath its hidden side,
And the Captain of St. Malo was rejoicing in his pride;
In the forests of the North—while his townsmen mourned his loss—
He was rearing on Mount Royal the *fleur-de-lis* and cross;
And when two months were over, and added to the year,
St. Malo hailed him home again, cheer answering to cheer.

He told them of a region, hard, iron-bound, and cold,
Nor seas of pearl abounded, nor mines of shining gold;
Where the wind from Thulé freezes the word upon the lip,
And the ice in Spring comes sailing athwart the early ship;
He told them of the frozen scene, until they thrilled with fear,
And piled fresh fuel on the hearth to make them better cheer.

But when he chang'd the strain—he told how soon are cast,
In early Spring, the fetters that hold the waters fast;
How the wintry causeway, broken, is drifted out to sea,
And the rills and rivers sing with pride the anthem of the free;
How the magic wand of Summer clad the landscape to his eyes,
Like the dry bones of the just when they wake in Paradise.

He told them of the Algonquin braves—the hunters of the wild;
Of how the Indian mother in the forest rocks her child;
Of how, poor souls! they fancy in every living thing
A spirit good or evil, that claims their worshipping;
Of how they brought their sick and maim'd for him to breathe upon;
And of the wonders wrought for them, thro' the Gospel of St. John.

He told them of the river whose mighty current gave
Its freshness for a hundred leagues to Ocean's briny wave;
He told them of the glorious scene presented to his sight,
What time he reared the cross and crown on Hochelaga's height;
And of the fortress cliff that keeps of Canada the key;—
And they welcomed back Jacques Cartier from his perils o'er the sea.

WHEN SUMMER COMES *

This poem by a Canadian author, John E. Logan ("Barry Dane"), is not strong, but has a certain haunting sweetness and melody, which is immediately felt, yet difficult to define.

WHEN summer comes,
Ah, so we longing sigh,
When winter winds are nigh,
When summer comes;
Our pulses like the rill
That now lies cold and still
Beneath the snow,
Will joyous flow
When summer comes.

When summer comes,
A messenger will bring
New life to everything,
When summer comes;
And unto you and me
Now parted, there may be
A moment sweet,
What time we meet,
When summer comes.

When summer comes,
Ah, the sweet, longed-for day
May be, yet pass away,
When summer comes;
And our sad feet have missed
The long expected tryst—
What shall we know
Of joy or woe
When summer comes?

When summer comes,
Alas, our hearts may yearn
For winter to return,
When summer comes;
The future we forecast,
We dream its joys shall last,
To-day is fraught
With but one thought
"When summer comes."

* By permission of the author.

THE UNNAMED LAKE *

Reverend Frederick George Scott, clergyman, author and poet has produced in this simple, short poem a little masterpiece.

IT sleeps among the thousand hills
  Where no man ever trod,
And only nature's music fills
  The silences of God.

Great mountains tower above its shore,
  Green rushes fringe its brim,
And o'er its breast for evermore
  The wanton breezes skim.

Dark clouds that intercept the sun
  Go there in Spring to weep,
And there, when Autumn days are done,
  White mists lie down to sleep.

Sunrise and sunset crown with gold
  The peaks of ageless stone,
Where winds have thundered from of old
  And storms have set their throne.

No echoes of the world afar
  Disturb it night or day,
But sun and shadow, moon and star,
  Pass and repass for aye.

'Twas in the grey of early dawn,
  When first the lake we spied,
And fragments of a cloud were drawn
  Half down the mountain side.

Along the shore a heron flew,
  And from a speck on high,
That hovered in the deepening blue,
  We heard the fish-hawk's cry.

Among the cloud-capt solitudes,
  No sound the silence broke,
Save when, in whispers down the woods,
  The guardian mountains spoke.

Through tangled brush and dewy brake,
  Returning whence we came,
We passed in silence, and the lake
  We left without a name.

A CANADIAN BOAT-SONG

Thomas Moore, the celebrated writer of Irish melodies, has written this charming Canadian boat-song. Listen to the distant song of the rapids, and note the sense of danger which is suggested by the changing metre of the refrain.

FAINTLY as tolls the evening chime
  Our voices keep tune and our oars keep time;
Soon as the woods on shore look dim,
We'll sing at St. Anne's our parting hymn.
  Row, brothers, row, the stream runs fast,
  The rapids are near, and the daylight's past.

Why should we yet our sail unfurl?
There is not a breath the blue wave to curl;
But when the wind blows off the shore
O sweetly we'll rest our weary oar.
  Blow, breezes, blow, the stream runs fast,
  The rapids are near, and the daylight's past.

Utaw'a's tide! this trembling moon
Shall see us float over thy surges soon.
Saint of this green isle! hear our prayers;
O grant us cool heavens and favouring airs.
  Blow, breezes, blow, the stream runs fast,
  The rapids are near, and the daylight's past.

* By permission of the author.

THE SONG MY PADDLE SINGS *

E. Pauline Johnson, daughter of Chief Johnson of the Mohawk Indians of Canada, was the author of this beautiful poem, set to the rhythm of the paddle of a canoe.

WEST wind, blow from your prairie nest,
  Blow from the mountains, blow from the west.
The sail is idle, the sailor too;
Oh! wind of the west, we wait for you.
Blow, blow!
I have wooed you so,
But never a favour you bestow;
You rock your cradle the hills between,
But scorn to notice my white lateen.

I stow the sail and unship the mast:
I wooed you long, but my wooing's past;
My paddle will lull you into rest:
O drowsy wind of the drowsy west,
Sleep, sleep!
By your mountains steep,
Or down where the prairie grasses sweep,
Now fold in slumber your laggard wings,
For soft is the song my paddle sings.

August is laughing across the sky,
Laughing while paddle, canoe, and I
Drift, drift,
Where the hills uplift
On either side of the current swift.
The river rolls in its rocky bed,
My paddle is plying its way ahead,
Dip, dip,
When the waters flip
In foam as over their breast we slip.

And oh, the river runs swifter now;
The eddies circle about my bow:
Swirl, swirl!
How the ripples curl
In many a dangerous pool awhirl!
And forward far the rapids roar,
Fretting their margin for evermore;
Dash, dash;
With a mighty crash,
They seethe and boil, and bound and splash.

Be strong, O paddle! be brave, canoe!
The reckless waves you must plunge into.
Reel, reel,
On your trembling keel,
But never a fear my craft will feel.
We've raced the rapids; we're far ahead;
The river slips through its silent bed.
Sway, sway,
As the bubbles spray
And fall in tinkling tunes away.

And up on the hills against the sky,
A fir-tree rocking its lullaby
Swings, swings,
Its emerald wings,
Swelling the song that my paddle sings.

* By permission of L. A. Makovski, Executor.

THE WALKER OF THE SNOW

Charles Dawson Shanley gives great vividness and reality to an old legend of the haunted valley and the Shadow Hunter.

SPEED on, speed on, good Master!
The camp lies far away;
We must cross the haunted valley
Before the close of day.

How the snow-blight came upon me
I will tell you as I go,—
The blight of the Shadow Hunter,
Who walks the midnight snow.

To the cold December heaven
Came the pale moon and the stars,
As the yellow sun was sinking
Behind the purple bars.

The snow was deeply drifted
Upon the ridges drear,
That lay for miles around me
And the camp for which we steer.

'Twas silent on the hillside,
And by the solemn wood,
No sound of life or motion
To break the solitude,

Save the wailing of the moose-bird
With a plaintive note and low,
And the skating of the red leaf
Upon the frozen snow.

And said I, "Though dark is falling,
And far the camp must be,
Yet my heart it would be lightsome
If I had but company."

And then I sang and shouted,
Keeping measure, as I sped,
To the harp-twang of the snow-shoe
As it sprang beneath my tread.

Not far into the valley
Had I dipped upon my way,
When a dusky figure joined me,
In a capuchon of gray,

Bending upon the snow-shoes,
With a long and limber stride;
And I hailed the dusky stranger
As we travelled side by side.

But no token of communion
Gave he by word or look,
And the fear-chill fell upon me
At the crossing of the brook.

For I saw by the sickly moonlight
As I followed, bending low,
That the walking of the stranger
Left no footmarks on the snow.

Then the fear-chill gathered o'er me,
Like a shroud around me cast,
As I sank upon the snow-drift
Where the Shadow Hunter passed.

And the other trappers found me,
Before the break of day,
With my dark hair blanched and whitened
As the snow in which I lay.

But they spoke not as they raised me;
For they knew that in the night
I had seen the Shadow Hunter,
And had withered in his blight.

Sancta Maria speed us!
The sun is falling low,—
Before us lies the valley
Of the Walker of the Snow!

THE RED RIVER VOYAGEUR *

Pioneer days in Canada were full of dangers and difficulties. The American poet, John Greenleaf Whittier, pictures the boatman on the Red River listening to the far-away sound of the Mission bells that speak to him of peace and protection.

OUT and in the river is winding
The links of its long, red chain,
Through belts of dusky pine land
And gusty leagues of plain.

Only, at times, a smoke-wreath
With the drifting cloud-rack joins—
The smoke of the hunting-lodges
Of the wild Assiniboins!

Drearily blows the north wind
From the land of ice and snow;
The eyes that look are weary,
And heavy the hands that row.

And with one foot on the water,
And one upon the shore,
The Angel of Shadow gives warning
That day shall be no more.

Is it the clang of wild geese?
Is it the Indian's yell,
That lends to the voice of the north wind
The tones of a far-off bell?

The voyageur smiles as he listens
To the sound that grows apace;
Well he knows the vesper ringing
Of the bells of St. Boniface.

The bells of the Roman Mission,
That call from their turrets twain,
To the boatman on the river,
To the hunter on the plain!

Even so in our mortal journey
The bitter north winds blow,
And thus upon life's Red River
Our hearts, as oarsmen, row.

And when the Angel of Shadow
Rests his feet on wave and shore,
And our eyes grow dim with watching,
And our hearts faint at the oar,

Happy is he who heareth
The signal of his release
In the bells of the Holy City,
The chimes of eternal peace!

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THE MOUNTED POLICE *

Robert W. Service celebrates in this poem the bravest body of men on the continent. Dauntless and daring, the Northwest Mounted Police are the right arm of the law, and the terror of the evil-doer throughout all that vast territory.

IN the little Crimson Manual it's written plain and clear,
That who would wear the scarlet coat shall say good-bye to fear;
Shall be a guardian of the right, a sleuth-hound of the trail—
In the little Crimson Manual there's no such word as "fail."
It's duty, duty, first and last, the Crimson Manual saith;
The Scarlet Rider makes reply: "It's duty—to the death."
And so they sweep the solitudes, free men of all the earth;
And so they sentinel the woods, the wilds that know their worth;
And so they scour the startled plains, and mock at hurt and pain,
And read their Crimson Manual, and find their duty plain.
Knights of the lists of unrenown, born of the frontier's need,
Disdainful of the spoken word, exultant in the deed;
Unconscious heroes of the waste, proud players of the game;
Props of the power behind the throne, upholders of the name;
For thus the Great White Chief hath said, "In all my lands be peace,"
And to maintain his word he gave his West the Scarlet Police.

* Copyright, Canada, William Briggs.

HARVEST TIME *

That wonderful hush of fruition which comes to the fields which are fully ripe, and before the bustle and activity of gathering the harvest, is well described in this poem by E. Pauline Johnson, who was born in 1862 and died in 1913.

PILLOWED and hushed on the silent plain,
Wrapped in her mantle of golden grain,

Wearied of pleasuring weeks away,
Summer is lying asleep to-day,—

Where winds come sweet from the wild-rose briers
And the smoke of the far-off prairie fires.

Purple her eyes as the mists that dream
At the edge of some laggard sun-drowned stream,

But over their depths the lashes sweep,
For Summer is lying to-day asleep

The north wind kisses her rosy mouth
His rival frowns in the far-off south.

And comes caressing her sunburnt cheek,
And Summer awakes for one short week

Awakes and gathers her wealth of grain,
Then sleeps and dreams for a year again.

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THE RAPID

This poem by Charles Sangster, Canadian journalist and poet, is full of the dash and danger of the rushing rapid.

ALL peacefully gliding,
The waters dividing,
The indolent batteau moved slowly along;
The rowers light-hearted,
From sorrow long parted,
Beguiled the dull moments with laughter and song:
"Hurrah for the Rapid! that merrily, merrily
Gambols and leaps on its tortuous way;
Soon we will enter it, cheerily, cheerily,
Pleased with its freshness, and wet with its spray."

More swiftly careering,
The wild Rapid nearing,
They dash down the stream like a terrified steed;
The surges delight them,
No terrors affright them,
Their voices keep pace with their quickening speed:
"Hurrah for the Rapid! that merrily, merrily
Shivers its arrows against us in play;
Now we have entered it, cheerily, cheerily,
Our spirits as light as its feathery spray."

Fast downwards they're dashing,
Each fearless eye flashing,
Though danger awaits them on every side;
Yon rock—see it frowning!
They strike—they are drowning!
But downward they speed with the merciless tide:
No voice cheers the Rapid, that angrily, angrily
Shivers their bark in its maddening play;
Gaily they entered it—heedlessly, recklessly
Mingling their lives with its treacherous spray!

SONG OF THE GOLDEN SEA *

This "Song," by Jean Blewett, the author of "The Cornflower and Other Poems," brings a beautiful picture before the eye.

SING, ye ripening fields of wheat,
Sing to the breezes passing by,
Sing your jubilant song and sweet,
Sing to the earth, the air, the sky!

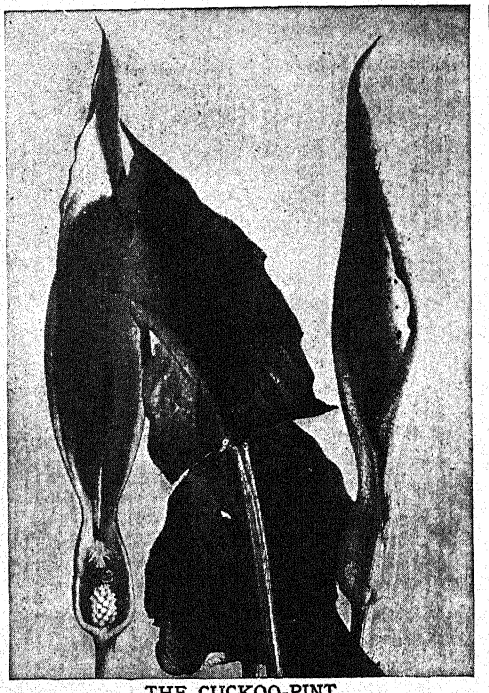
Earth that held thee and skies that kissed
Morning and noon and night for long,
Sun and rain and dew and mist,
All that has made you glad and strong!

The harvest fields of the far, far west
Stretch out a shimmering sea of gold!
Every ripple upon its breast
Sings peace, and plenty and wealth untold!

Far as the eye can reach it goes,
Farther yet, 'til there seems no end,
Under a sky where blue and rose
With the gold and turquoise softly blend.

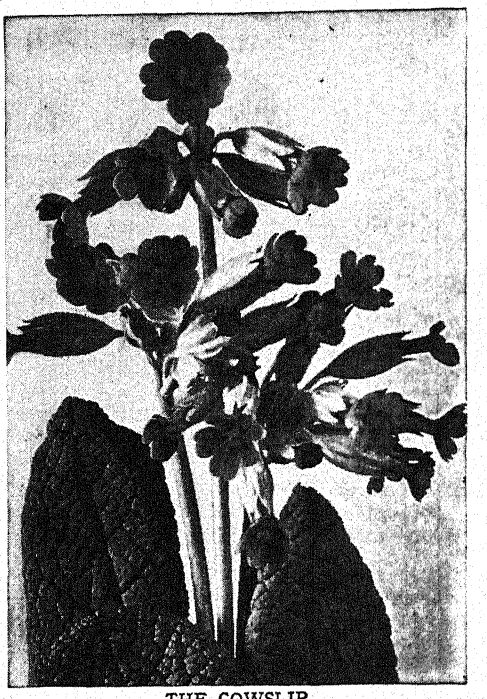
Here, where sweep the prairies lone,
Broad and beautiful in God's eyes,
Here in this young land, all our own,
The garner-house of the old world lies.

* By permission of the author.



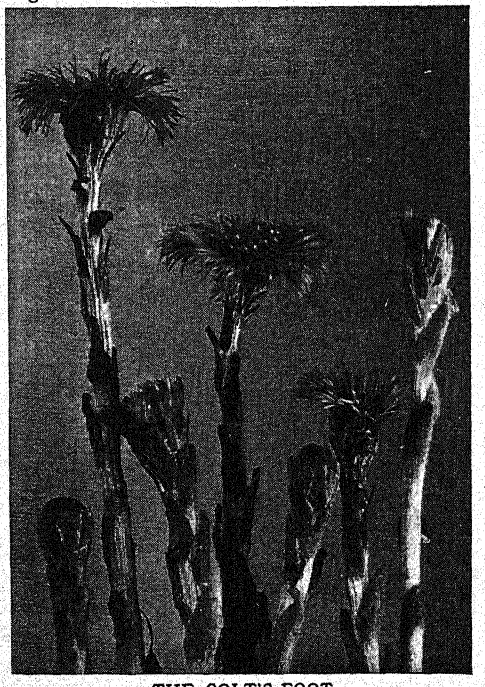
THE CUCKOO-PINT

The cuckoo-pint, or wake-robin, has a great rolled-up leaf, like a monk's hood, inside which form the bright red berries that are called lords-and-ladies.



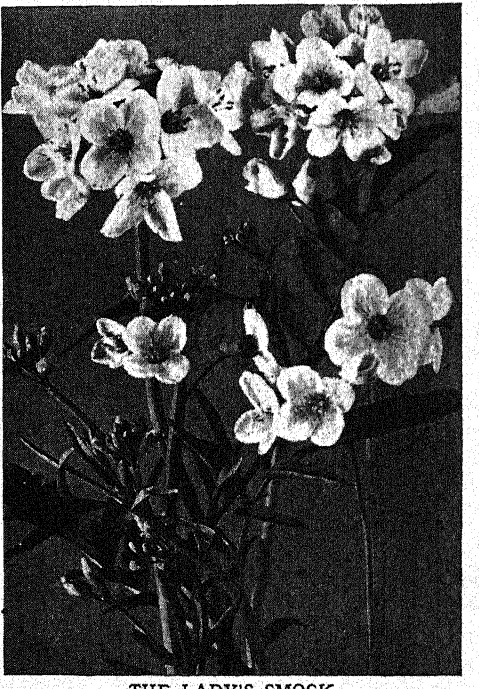
THE COWSLIP

We all know the yellow funnel-shaped flowers of the cowslip, with their fragrance and store of honey. In this country the cowslip is a garden flower.



THE COLT'S-FOOT

The colt's-foot gets its name from its leaf, which is shaped like the hoof of a colt. The flowers, like bright golden stars, are among the first that appear in spring. The leaves are used as a remedy for coughs.



THE LADY'S SMOCK

The lady's smock, or cuckoo flower, is common in American marshes in spring. The blossoms, ranging from pale purple to white, have a dainty appearance. Country people eat the leaves as salad.



FLOWERS OF BRITISH AUTHORS

CONTINUED FROM 4565

WHEN we are reading either prose or poetry of English authors, from the earliest times to Shakespeare, and until now, we constantly find references to certain flowers. These are very familiar to the English people, but for Americans, the quaint old names rarely call forth any mental picture of the plants, except, perhaps, of a few that are grown in our gardens, such as the daisy and the daffodil.

Yet around some of them a wealth of legend and folklore has arisen, and their very names, various as they may be, reveal glimpses of history and custom, or of the keen observation of nature that has contributed towards their naming. Many plants received their titles when fairies were abroad in the land, and needed thimbles and stools and rings to dance in. Others won their names by their colors, or their uses, real or imagined, and by their fancied resemblance to something else.

THE CUCKOO-PINT

As our shadbush blooms when the shad are running, so the cuckoo-pint of Great Britain enters into its prime when the cuckoos begin to cluck furtively in the budding trees. It is an arum not unlike our jack-in-the-pulpit, or skunk-cabbage, and strange as it may seem, is a distant relation of the exquisite white calla. It has a great many common names, as lords and ladies, or wake-robin, and the fruit is called snake's meat, poison berries, and various other scornful names. Towards the end of January or early in February the great, glossy green, arrow-shaped leaves of the cuckoo-pint break through the earth, at first rolled up, but soon expanding, and then many of them show purplish-black blotches.

But it is not until late in March or early in April that the pale yellow green hoods come up and open their fronds, revealing the purplish, poker-like pin. Most people regard this hood as the flower of the cuckoo-pint, but it is really only an outside covering. If we tear it carefully aside, we shall find that the real flowers, in great numbers, are clustered round the lower part of the pin. Looking at the hood we shall see that it has a sort of waist, which divides the open upper part from the closed lower part, and, inside, the two parts are farther separated by a fringe of hairs standing out from the pin, or pintle, as it is named.

The flowers are below these hairs,

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very small, and without either sepals or petals. First there is a crowded band of stamens, and below these a similar band of crowded pistils. The hairs of the fringe above them all bend slightly downwards. The pistils are mature before the stamens are ready to shed their pollen; and those who have carefully studied the plant and its peculiarities tell us that when the pistils are ready the cuckoo-pint sends forth an unpleasant odor, which is attractive to certain small hairy-winged flies, who fly to it, and seeing the purple pintle, think it is something in which they can lay their eggs.

Finding out their mistake, the flies follow the scent to the lower part of the hood. The fringe of hairs bends to let them pass, but springs back at once to shut them in, for the hairs will not bend upwards. When autumn comes, we see the result of the work of these little flies in the bright red berries clustered around the remains of the pintle.

THE BUTCHER'S BROOM, ONE OF THE EARLIEST FLOWERS

One of the earliest flowers to appear in Great Britain is the butcher's broom, which may be looked for at any time between November and March. The plant is a prickly shrub, whose leaves are reduced to thin scales, that soon drop off and can rarely be found. But, instead of leaves, the butcher's broom has flattened out its twigs until they are egg-shaped, with a very sharp, hard point at the upper end. Most people take these for leaves, but if we find the plant in blossom we shall see that the flowers come out of the centre of these flattened twigs, which are known as cladodes. No plant produces flowers from its leaves. The flowers are not more than a quarter of an inch across, and consist of three sepals and three petals, because they belong to the lily family. They are pale greenish-yellow, with a violet-purple centre.

The stiff, prickly cladodes and the red berries have caused the plant to be called in some places the knee-holly. Underground there is a thick, fleshy creeping stem, or root-stock. This is the only shrubby lily in Great Britain.

THE DAFFODIL, CALLED DAFFYDOWNDILLY BY THE POETS

In some British woodlands, in March or April, we may come across great spaces that are turned to gold by the nodding trumpets of the daffodil, or Lent lily.

> "When daffodils begin to peer,—
> With, heigh! the doxy o'er the dale,—
> Why, then comes in the sweet o' the year:
> For the red blood reigns in the winter's pale."

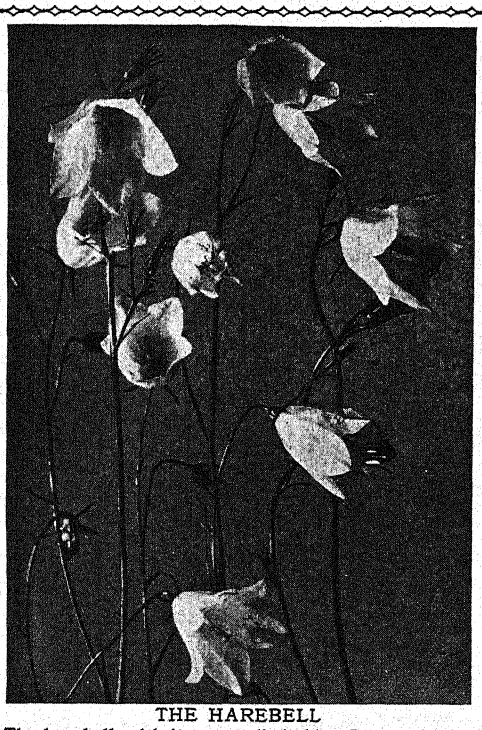
So sings a rogue in the "Winter's Tale," and over and over again do the poets refer to the early blossoming of the daffydowndilly.

Though it looks more like a lily than does the butcher's broom it does not belong to that family but to the Amaryllis family, to which the snowdrop also belongs. The long strap-like leaves, with straight sides, spring from a pear-shaped bulb, and from their middle rises the tall pipe-like stem, or scape, bearing a single bud, that is covered by a papery skin, or spathe.

As the bud swells, this wrapper is split down one side and pushed back. There are three sepals and three petals joined together at their base, but the six of them are alike in form and color, and they are collectively known as the perianth. This is of the beautiful pale yellow tint that is so familiar to us in the primrose; but the mouth of the perianth-tube has grown out into a rich yellow trumpet with a toothed and crinkled mouth. There are six stamens and one pistil.

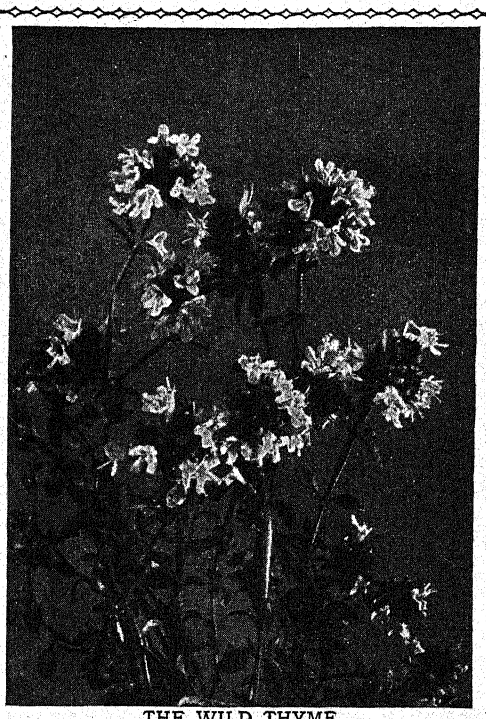
THE FAIR PALE PRIMROSE, LOVELIEST OF SPRING FLOWERS

The rather pale primrose, "the firstling of the year," comes with the daffodil, and is the most renowned of the primrose family. It has a salver-form corolla, with a widely flaring, five-parted brim. Five stamens spring from the tube of the corolla; sometimes from near its base, with a long pistil, sometimes from near its top, with a short pistil. In the latter case they are called "thrumeyed," in the former, "pineyed." The lower stamens, in the one form, are just about on the same level as the stigma in the form with a short pistil. Thus a bee, down-thrusting his proboscis in the one, gets it well dusted with pollen in just the place to have it brushed off by a pistil in a similar position, and the upper stamens powder the proboscis for the long pistil. "Hence we see that by this beautiful arrangement, insects must carry the pollen of the long-styled form to the short-styled, and vice versa."



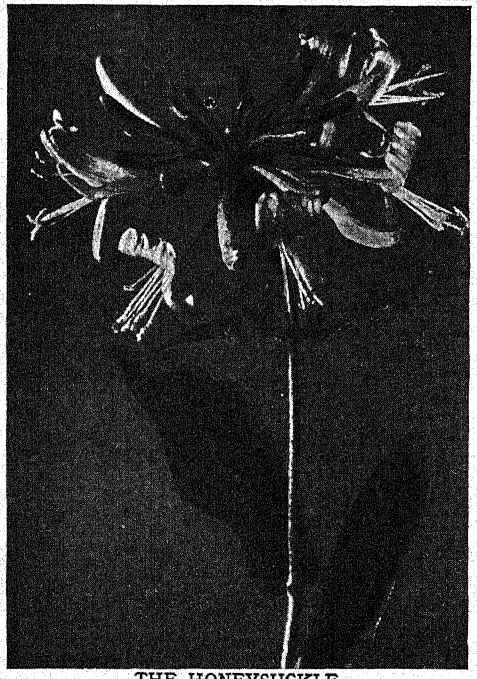
THE HAREBELL

The harebell, with its pretty little blue flowers, is the true bluebell of Scotland. Some people spell the name harebell, saying that it grows where hares live; but the true name of the flower is heather-bell.



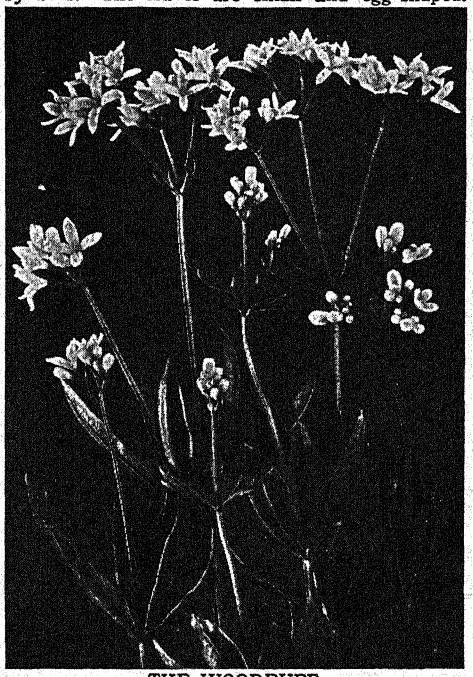
THE WILD THYME

The fragrant thyme, with its rose-colored flowers, was formerly regarded as a cure for "melancholy and frenzy," and used as medicine. It is much visited by bees. The leaves are small and egg-shaped.



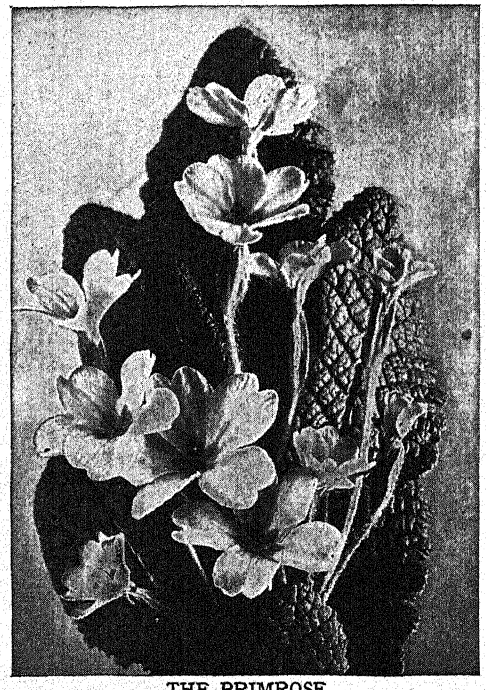
THE HONEYSUCKLE

Few flowers are more deliciously fragrant than the honeysuckle, or woodbine, which in some parts of Scotland used to be placed in cowsheds to prevent the cattle from being bewitched. The berries are crimson.



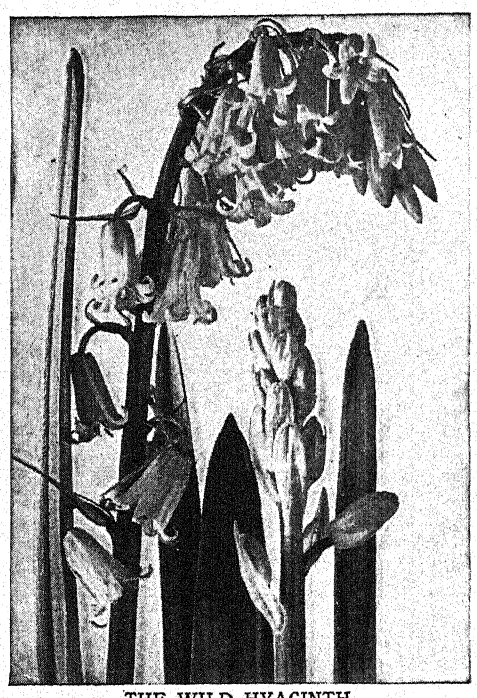
THE WOODRUFF

One of the daintiest flowers found in shaded dells is the woodruff, with its clusters of little white cross-shaped blossoms. When dry, the plant is very fragrant, and is used by country people to pack with linen.



THE PRIMROSE

No wild flower is better known than the simple, beautiful primrose. It is abundant in early spring before other flowers are out, and its name means "first rose."



THE WILD HYACINTH

This lovely spring flower drapes curtains of exquisite blue on the openings of the woodlands in the British Isles, in the months of April and May.



THE DEADLY NIGHTSHADE

This plant merits its name, for people who eat the berries soon die. The flowers are in the form of dull purple bells. A preparation of deadly nightshade called belladonna is used by doctors and oculists.



THE HEARTSEASE

The heartsease, or wild pansy, is really a violet, but its color varies from white to yellow and purple, and usually it has two or three of these tints together. It was formerly used as a medicine for heart disease.



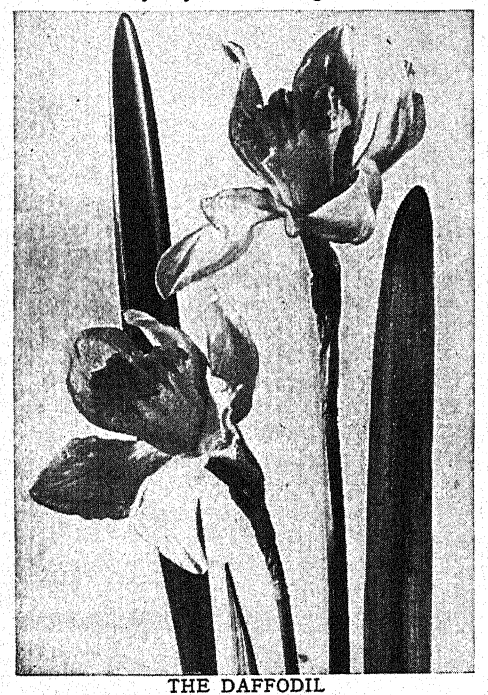
THE BUTCHER'S BROOM

The butcher's broom is so called because butchers used to preserve meat from rats and mice by covering it with this plant. The small greenish-white flowers are succeeded by very attractive bright scarlet berries.



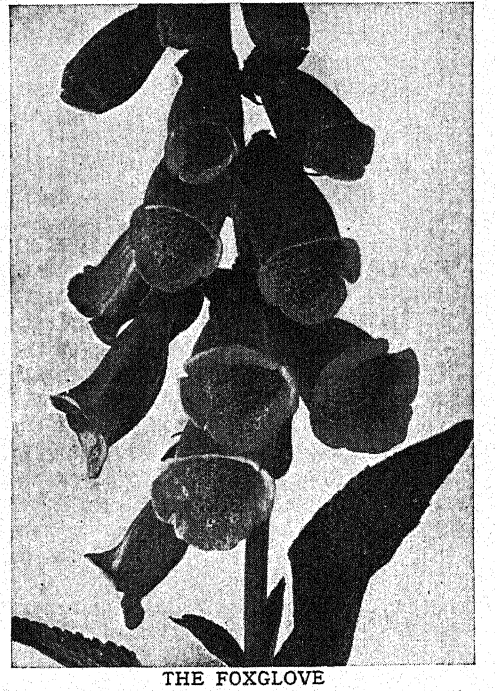
THE COMMON RED POPPY

The red poppy is, perhaps, the most brilliantly colored British flower; in fields of grain, where it grows abundantly, its bright scarlet flowers form a striking contrast to the golden waving grain.



THE DAFFODIL

Where the daffodil is found it grows in abundance, and the poet Wordsworth wrote of this flower, "ten thousand saw I at a glance." Country children are fond of "going daffying," as they call daffodil-picking.



THE FOXGLOVE

The handsome, stately foxglove, with its flowers like crimson bells, has many names, such as thimble-flower, fairy's petticoat, and fairy-cap. Foxglove means folk's or fairy's glove. The leaves are broad and long.

THE GOLDEN FLOWERS OF THE COLT'S-FOOT

Another early flower that in England we may find growing in the untidy corners of a meadow, or under a hedge, is the colt's-foot, so called because its roundish large leaf is the shape of a young horse's hoof. But we shall rarely see its leaves until its flower-heads have turned into small clocks, or puffs, something like those of the dandelion. Each flower-head looks like a golden daisy, but it has a much longer stalk than a daisy, and its yellow straps are extremely narrow. It has a stout root-stock, which creeps underground, and sends off burrowing runners, so that we shall find it usually growing in extensive patches.

THE LADY'S SMOCK, OR CUCKOO-FLOWER, OF THE MEADOW

In April and May we shall find the damper parts of the meadow covered with the lady's smock, "all silver-white," or cuckoo-flower or milkmaid, as it is variously called. The four-petaled flowers that, in spite of Shakespeare, are sometimes mauve, are of similar form to those of the wallflower, and the two plants belong to the same family, but the leaves are very different from those of the wallflower. The flowering stem is not sent up until spring, and on it there are much shorter leaves, with the leaflets long and slender instead of round. The seeds are in long slender pods like those of the wallflower.

THE COWSLIP, BELOVED RETREAT OF THE FAIRIES

About the time the milkmaid is in flower, we ought also to find the cowslip. Its near relative, the primrose, is a plant of the woods, and is not particular as to the kind of soil, so long as there is plenty of leaf-mold above it. But the cowslip is fond of heavy soils, such as clay-loam and chalk-loam; consequently it is not to be found on light sandy soil, but is a distinct meadow plant. In some districts the meadows are thickly studded with clumps of cowslip, their yellow flowers standing high above their rosettes of leaves.

The cowslip flowers grow in a cluster right at the summit of the juicy flower-stem, which has no leaves at all, and is therefore called a scape. The five sepals are united into a calyx, and the five petals into a corolla, the teeth of the calyx and the lobes of the corolla showing the number of parts of which they are made up. There are five stamens attached to the corolla-tube, and the pistil has a rounded stigma like the head of a pin. As in the primrose there are two kinds of flowers, one with the anthers of the stamens almost closing the mouth of the corolla-tube and the stigma almost half-way down the tube, and the other with the stamens half-way down the tube, and the stigma at its mouth. All the flowers on one plant are of one kind only, the two forms never growing on the same plant.

The "cowslips wan" are the legendary retreat of fairies, who creep into them during showers.

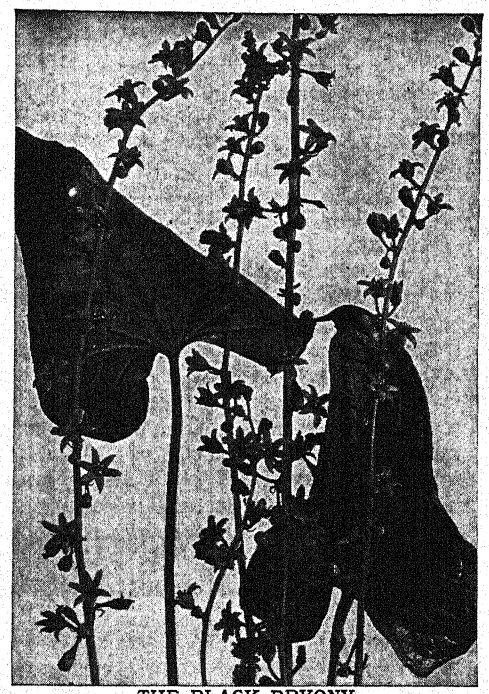
THE FRAGRANT BLUEBELL OF THE ENGLISH POETS

Americans are likely to be puzzled by the frequent references to bluebells in English books. On this side of the water, the bluebells of Scotland are those that we think of first,—those nodding campanulas that dance not only on the heaths of Scotland, but on our northern cliffs, and rocky hillsides. However, in England, quite another flower is meant, the delicate hyacinth-like, fragrant squills that we often find in our gardens—generally known as scillas—and that, blooming very early in spring, "purple all the ground with vernal flowers."

THE HAREBELL, OR HEATHER-BELL OF SCOTLAND

"Mourn, little harebells o'er the lea," cries Burns, referring to the flower that is the darling of Scotland, that overtops the heaths and the heather. Elsewhere he speaks of "heather bells," which is the proper name for them; but the Scots shortened the sound into hea'er-bell, and Englishmen have got into the way of spelling it harebell. The pendent position of the harebell not only favors the bees which alight by clinging to the pistil and reaching far into the bell to get at the nectar at the base of the stamens, but prevents undesirable visitors from entering. It also, by forming a roof, protects the pollen from rain.

And this is very important, for the whole tribe of bell-flowers, or campanulas, are capable of self-pollination, so that if insects fail to cross-fertilize them they can still perfect the seed. Other campanulas are also called bluebells. One kind having run wild, sends up tall spines of violet bells, along shady roadsides.



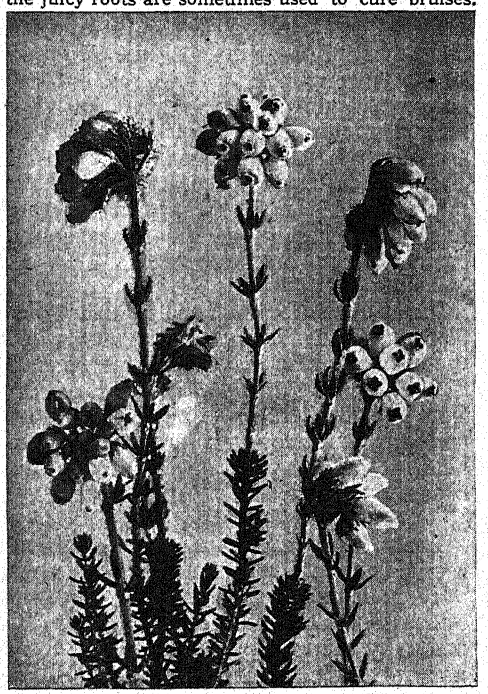
THE BLACK BRYONY

This is a climbing plant that twines round the support by which it rises. The flowers are yellow-green, and the juicy roots are sometimes used to cure bruises.



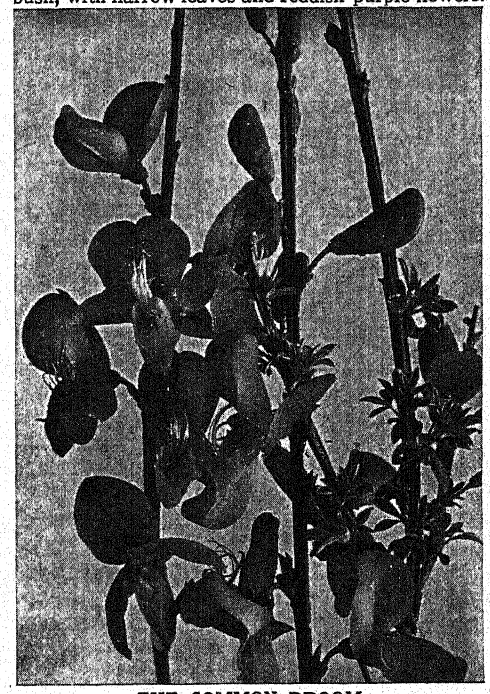
THE PURPLE HEATH

This plant, known also as the fine-leaved heath, is the commonest of all the British heaths. It grows as a bush, with narrow leaves and reddish-purple flowers.



THE CROSS-LEAVED HEATH

This heath is more general than the purple heath, but it does not grow so profusely, and is therefore less known. It gets its name from its leaves growing in fours round the stem and taking the form of a cross.



THE COMMON BROOM

The broom has been described by the poet as "yellow and bright as bullion unalloyed." Where other plants will not thrive, it clothes the landscape with beauty. The broom is often confounded with the furze.

THE DELICATE WHITE FLOWERS OF THE WOODRUFF

The blooming of the harebells indicates the on-coming of summer, but, previously, along the narrow roads, through the woods where the fallen leaves have made a thick layer of leaf-mold, we shall find in May the charming woodruff, whose pale, thin root-stock runs through the mold and sends up square, brittle stems that bear "ruffs" of polished, lance-shaped leaves that stick out equally all around. Above the several ruffs are delicate sprays or cymes of very small, pure white flowers, funnel-shaped with four spreading lobes around the mouth.

If we gather a handful of the stems and put them in our pocket, we shall find, as they dry, that they give out the pleasant odor of new-mown hay. It is occasionally found here as a fugitive from Europe, and resembles our climbing bedstraws, which belong to the Madder family.

THE STATELY SPIRE OF THE FOXGLOVE

Near them, perhaps, will shoot up into tall spires, "stately foxgloves fair to see," from among their large wrinkled leaves; and more than half of the four-foot length of stem is covered with the large purple-spotted crimson bells. The stamens and pistil are so carefully placed upon the upper wall that the portly bumble-bee, as it crawls in to get at the nectar, cannot fail to bring and carry off the pollen; while smaller insects are kept out by fringes of long hairs that stick in their faces. One foxglove plant produces a million and a half of seeds! There is much questioning as to the origin of this name. In several languages, the likeness of each flower to a glove-finger, or a thimble, has been noticed and in England it was supposed that fairy-folk donned them for headgear, while witches used them for thimbles. A useful medicine, digitalis, is extracted from the velvety leaves of the foxglove, although the plant, as a whole, is poisonous.

THE DEADLY NIGHTSHADE, OF WHICH WE MUST BEWARE

Another poisonous plant, but also medicinal, is the deadly nightshade, and all must beware of touching its big, black, cherry-like berry. This plant is bushy, about three feet high, with broad oval leaves. The drooping flowers are bell-shaped, greenish purple in color, and are produced singly. The whole plant is poisonous, and even the plucking of a spray may cause trouble to our eyes, so we must not touch it.

THE HEARTSEASE, WHICH RESEMBLES THE PANSY

But the little heartsease is not poisonous. Its flowers are seldom much more than an inch across, and often smaller; their shape and markings are just like garden pansies. At the base of the leaves there appear to be smaller leaves, but they are really stipules. In the pansy they are large and leaf-like, so they are commonly looked upon as leaves. Usually the petals are white with yellow and purple lines, but sometimes the upper petals are purple and the lower ones yellow.

The purple lines all run to the entrance to the nectar-tube, where there are two yellow spots, so that long-tongued insects shall not miss the way.

THE WILD THYME IS THE HAUNT OF THE BEES

"I know a bank whereon the wild thyme grows," quoth Oberon, and a wonderfully odorous and bee-haunted bank it doubtless was. While it grows in its evergreen low tufts it is very fragrant and pretty. Even its pale flowers standing thickly at the tips of the branches are of a pleasing "rosy" tint. The garden-thyme is very similar but comes from the Mediterranean shores. It is one of the aromatic mint family.

THE SCARLET POPPY OF THE GRAIN-FIELDS

The typical flower of the British grain-fields is the scarlet poppy. In June, when the wheat stalks have not yet reached their full height, many grain-fields appear from a distance to have nothing but poppies in them, and are a sheet of blazing scarlet.

THE GUELDER ROSE, THE ANCESTOR OF OUR SNOW-BALLS

Last of all, we will mention the charming guelder rose which attracts attention to its fruit-bearing treasures by the circle of gay, but otherwise useless flowers. By gradually increasing the number of these snowy, sterile florets, the florists have built up the white globes that are so familiar in old-fashioned gardens. The picture of this flower is on page 4355.

THE NEXT NATURE STORY IS ON PAGE 4757.



THE FLOOD AT LINTON FALLS

CONTINUED FROM 4601

SWOLLEN to twice its usual size by long-continued rains, the River Wharfe raced between its banks with a noise like thunder. At Skipton it was no longer a peaceful river, but a wild torrent—grand, indeed majestic, in appearance, perilous to a degree to any who might come within the sweep of its impetuous course.

Heedless of all but play, two little boys were amusing themselves on the bank. Occasionally their laughter rang out on the air as they tumbled about, one on top of the other. Then they would pick themselves up, and off they would go again.

Suddenly, one of them, a child only five years of age, slipped and fell into the torrent. In a moment he was swept away and carried downstream with great swiftness.

The screams of his companion attracted the attention of Kate Verity, a girl in a mill close by. Throwing down the book she was reading, she rushed out to see what was the matter. A glance was sufficient to show her all that had happened. With amazing quickness, she decided what was best to be done. To have plunged into the river at that point was useless, for by this time, brief as was the period that had elapsed, the child had been carried at least a hundred yards down the stream. Promptly the plucky girl set off, running along the bank in pursuit.

Barely thirty feet above the terrible Linton Falls she came level with him. A few yards more and nothing could save the boy from being carried into the white tumbling foam and dashed to pieces on the sharp rocks below.

The girl did not hesitate for an instant. Into the rapid current she plunged, as shown in the picture above, and caught the boy as he came sweeping downward. Then there followed a terrible struggle. The force of the water seemed to be irresistible.

The girl, however, knew well what she was about. Throwing the child across her shoulder, she struck out; the current held her, and for a while she made no headway. But there was no hurry, no fear; not once did the steady, strong sweep of her stroke give way to haste or excitement. Slowly, inch by inch, as it seemed, she forged her way towards the bank. More than once she was carried against a rock, and her destruction seemed imminent; but she came through without mishap, and was soon near enough to the bank to be dragged out of the water, almost exhausted, but still clutching the rescued boy.

For this gallant act, which so fortunately resulted in a successful rescue, the brave Yorkshire lass, Kate Verity, was awarded the bronze medal of the Royal Humane Society.

THE JUDGE WHO IMPRISONED A PRINCE

WHEN King Henry V. of England was a youth, he and his brothers grew tired of the irksome ways of the court, and scandalized the king, their father, and the staid courtiers by their practical jokes and mad frolics.

Prince Henry often grieved his father by his reckless behavior when in the company of his gay associates. He would disguise himself as a thief, and set upon and rob the men who had collected his father's rents. But he would reward honest, brave people, and his wild pranks seem to have been due more to boyish love of mischief and adventure and to boisterous spirits than to any real liking for ill-doing. However, his conduct and that of his brothers ill became royal princes, and Prince Henry's familiarity with some of his future subjects vexed his royal father very much.

There is one story about Prince Henry, or Prince Hal, as the people liked to call him, which not only redounds to his credit by showing he could be staunch to a friend in trouble, and take punishment with good grace, but tells how a judge put justice before the favor of man. Prince Henry's brothers, Thomas and John, once supped far into the night with some of their boon companions, and the feast ended in a riot, at which the city authorities had to interfere. The princes were angry at that, and as a result the Lord Mayor and aldermen were summoned before the king. He, however, soon dismissed them when they said they had merely done their duty in stopping a riot.

It was during another wild freak of this kind that one of Prince Henry's followers was charged and sentenced to imprisonment. When the prince heard what had befallen his favorite, he came to the judge, Chief Justice Gascoigne,



PRINCE HENRY GREW VERY ANGRY, AND DREW HIS SWORD UPON THE JUDGE

and ordered him to release his follower. But the judge, who feared the anger of the royal youth less than he feared the reproach of his own conscience, looked at him sternly, and told him justice must be done, though, at the same time, if the king willed, *he* could pardon the prisoner.

When Prince Henry saw that he could not overawe the judge, he grew very angry, and drew his sword on him threateningly. Then the judge called on him to recollect himself, and declared that he was there to fulfil his duty in place of the prince's own father, and that in his name he adjured him to

change his wilful conduct and set a good example to those who would one day be his own subjects.

"And now," he concluded, "because you are guilty of disobedience and contempt of this court, I commit you to the King's Bench Prison. There you will stay until the king, your father, orders your release."

The hot-tempered prince acknowledged the justice of the judge's words, and, laying his sword down, bowed to the courageous man who had sentenced him, and was then taken off to prison. It is said that when the king heard of what had occurred, he expressed his happy fortune in having for one of his judges a man who was not afraid to administer justice, and for a son a youth willing to submit to it.

Shakespeare, who wrote a great deal about Prince Henry in his plays, makes the king, his father, say these words:

Happy am I, that have a man so bold,
That dares do justice on my proper son;
And not less happy, having such a son,
That would deliver up his greatness so
Into the hands of justice.

Prince Henry afterwards treated Judge Gascoigne with much respect, recognizing that if he could keep so strictly to enforcing the laws of the country, even against the heir to the throne, who in the natural course of events would one day be his sovereign, then he would not regard the favor of any man, but seek to do his duty to all.

When Prince Henry did come to the throne, he justified the people's trust in him, and Judge Gascoigne was one of the upright men he consulted. Shakespeare puts these words into the mouth of Henry V., when addressing the judge:

. . . . Still bear the balance and the sword;
And I do wish your honours may increase
Till you do live to see a son of mine
Offend you, and obey you, as I did.

THE BRAVE SCHOOLGIRL IN ENGLAND

THE deeds of many humble heroes and heroines are quite unknown, but they are all worthy of record. Julia Hatcher, an English schoolgirl, lived at Moorside, a lonely spot near Blandford, Dorset. One day, while she was at work in her house, she was startled by the sound of screaming.

Going to the door, she was horrified to see a huge bull tossing a boy in a field on the other side of the road. Again and again the infuriated animal rushed at the prostrate figure, lifted him on its terrible horns, and threw him backwards high into the air, so that he fell heavily to the earth.

The lad's death seemed but a question of moments. Realizing this, Julia Hatcher rushed out to save him. It was a perilous errand, and one which seemed certain to prove fatal, for the furious bull was in no mood to permit interference.

But the girl's presence of mind was equal to the occasion. She remembered that bulls always shut their eyes when stoned, so as she hurried along she picked up a large handful of stones that lay directly in her path.

The moment she got within range she began to bombard the bull. Every stone did not take effect; some went very wide of the mark. They served, however, to divert the animal's attention from the boy—which, after all, was the main object. All the while she kept advancing till she came so near that it was impossible for her to miss her mark.

The bull resented these attentions, and several times he charged with lowered head. The girl stood her ground undaunted, meeting each fresh rush with a well-sustained shower of stones.

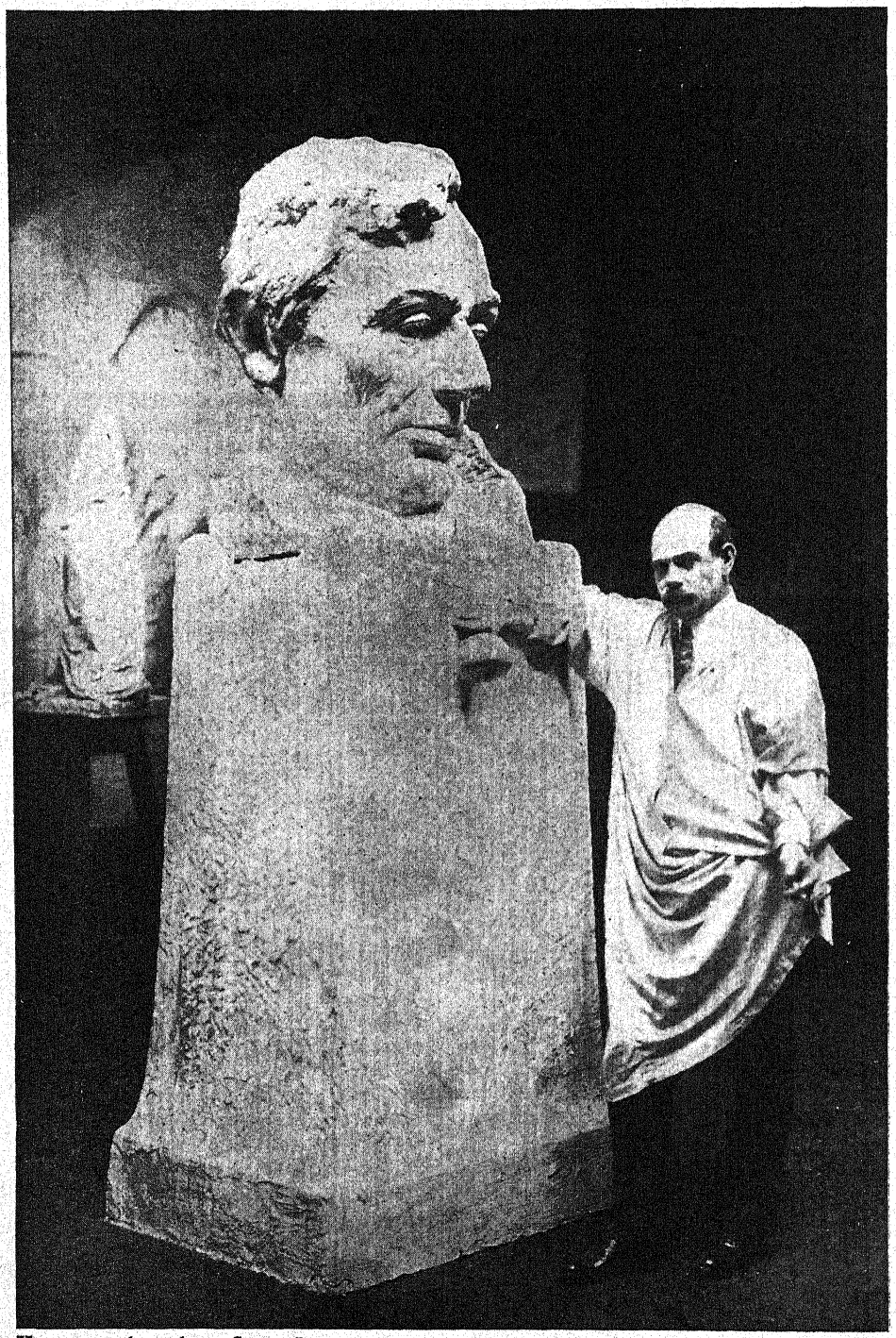
At length the bull paused, glared about him for a moment, and then turned tail. Prompt to improve her advantage, Julia followed, pelting him vigorously till he took himself off.

The courageous girl now turned her attention to the boy, who was by this time unconscious. He looked in a terrible condition. His clothes were torn to rags, and he was frightfully bruised and battered. Fortunately, no bones were broken. After a great deal of trouble, she restored him to consciousness. Eventually he recovered from the ill-effects of that terrible day, and quite regained his health.

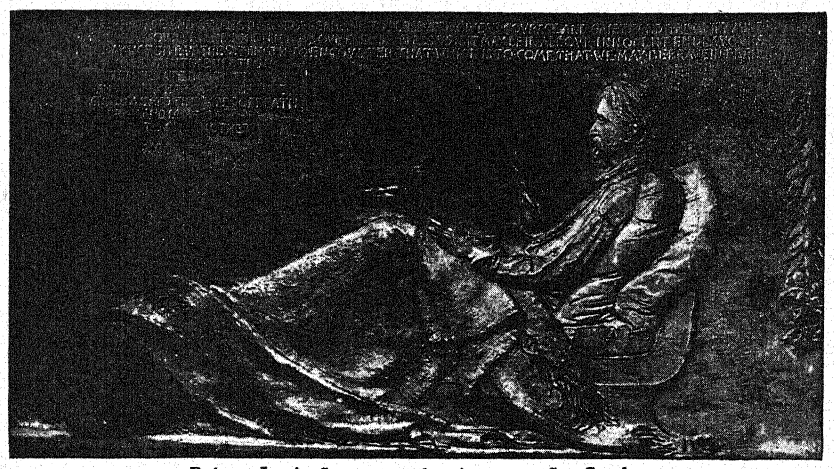
Had she not acted so courageously and promptly, and had she not remembered that bulls close their eyes when stones are thrown at them, there is no doubt that the boy would have lost his life. For this brave action in facing a bull she was awarded a bronze medal.

THE NEXT GOLDEN DEEDS ARE ON PAGE 4745.

A HEAD THAT CAN NEVER BE FORGOTTEN



Here we see the sculptor, Gutzon Borglum, in his studio, putting the final touches on the colossal head of Lincoln, now in the Capitol at Washington. No one else has succeeded so well in showing one side of the character of this great man. It is a sad face, apparently feeling the weight of all the terrible war, with the suffering it brought. A copy of the head in bronze is in the College of the City of New York.



Robert Louis Stevenson, by Augustus St. Gaudens.

SCULPTURE IN AMERICA

CONTINUED FROM 4575

IN this big storehouse of a world are many kinds of beauty. The painter cares most for beauty of color, for the exquisite variations in light and shade and atmosphere. Beauty of line and form are what the sculptor feels most keenly. His longing is to reveal the beauty which he perceives in objects in their mass.

Painters were our pioneers in art. They had inherited the artistic traditions of old England, where for long there were no important sculptors. For many years it was impossible for a would-be sculptor to get necessary training in this country. He had to seek it in Italy, for at home he met with little sympathy. Puritan prejudices were against him. He saw no sculpture, nor was there opportunity to study modeling from life until late in the nineteenth century. The first casts from the antique brought to this country aroused indignant protest from our austere forefathers. Nor was there any available marble to be had here as yet. Nothing was known about casting bronze.

In spite of all these difficulties, men of vigorous talent forced their way to success. An occasional visit from a foreign sculptor helped their cause. Thus Houdon came from Paris, in 1785, commissioned to make a statue of George Washington, which is now in Richmond. This is the only statue of the "Father of His Country" made from life. Copies of it are in several cities.

William Rush, born in Philadelphia in 1756, won distinction with cleverly carved figureheads for ships—The Genius of the United States for the frigate United States, the Indian Trader for the William Penn, Nature for the Constellation, and many others, some of which are still in existence. He was one of the founders of the Pennsylvania Academy of Fine Arts.

Horatio Greenough is not only one of the best known of our early sculptors, but typical of many who sought inspiration in Italy. Born in 1805, son of a successful Boston merchant, he was surrounded by the best social influences of his day. A marble statue in his father's garden, copy of an antique, inspired his desire to become

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a sculptor. He read art books at the Boston Athenæum, and a stone-cutter taught him something of carving marble. As soon as he had been graduated at Harvard he went to Rome, where he found the great Thorwaldsen ready to lend him a helping hand. At the famous quarries of Carrara he learned to handle marble. He went from success to success, obtaining many important commissions, paying home visits but spending most of his life in Florence. There his studio became a meeting-place for gifted people, and American visitors took home from it a wider understanding of sculpture.

AN UGLY STATUE OF WASHINGTON AS A ROMAN SENATOR

One of Greenough's best known pieces is a George Washington in classic attire which is now in the Smithsonian Institution, in Washington. It formerly stood on the Capitol grounds. To our eyes it is hideously ugly, and we wonder that any one could ever think it proper to represent Washington in the garb of a Roman Senator. Greenough's work, like that of most of his contemporaries, suffered from his unbounded enthusiasm for ancient art. As a result, our early sculpture is largely imitative. The ardent disciples tried in vain to catch the inspiration of the old Greek and Roman masters. They failed to realize that no really great work could be produced until they trusted their own knowledge of life.

THE MAN WHO MODELED THE GREEK SLAVE

Hiram Powers, born in the same year as Greenough, had a harder time becoming a sculptor. His parents were poor, had many children, and Hiram had early to take care of himself. His skill in modeling led to employment in a dime museum, where he made wax figures. From this he turned to portrait busts, with which he was very successful. When thirty-two he had saved enough to go to Florence, where he found the atmosphere so congenial that he remained. The Greek Slave, copies of which are in many art museums, is his most famous work, and in its day received the highest commendation. It is lovely and pleasing, although to modern taste most of Powers' work seems somewhat tame. He has a genuine gift for portraiture, as is shown by his vigorous busts of Franklin, Webster, and others.

Thomas Crawford was born in New York, but also sought training in Rome, and was heartily admired by Thorwaldsen. He modeled the Liberty on the dome of the Capitol at Washington, and made good statues of Patrick Henry and Thomas Jefferson, now in Richmond. His gently imaginative work is more an individual expression than that of most of his predecessors. The Dancing Girl is perhaps the most popular to-day. He was the father of F. Marion Crawford, the writer.

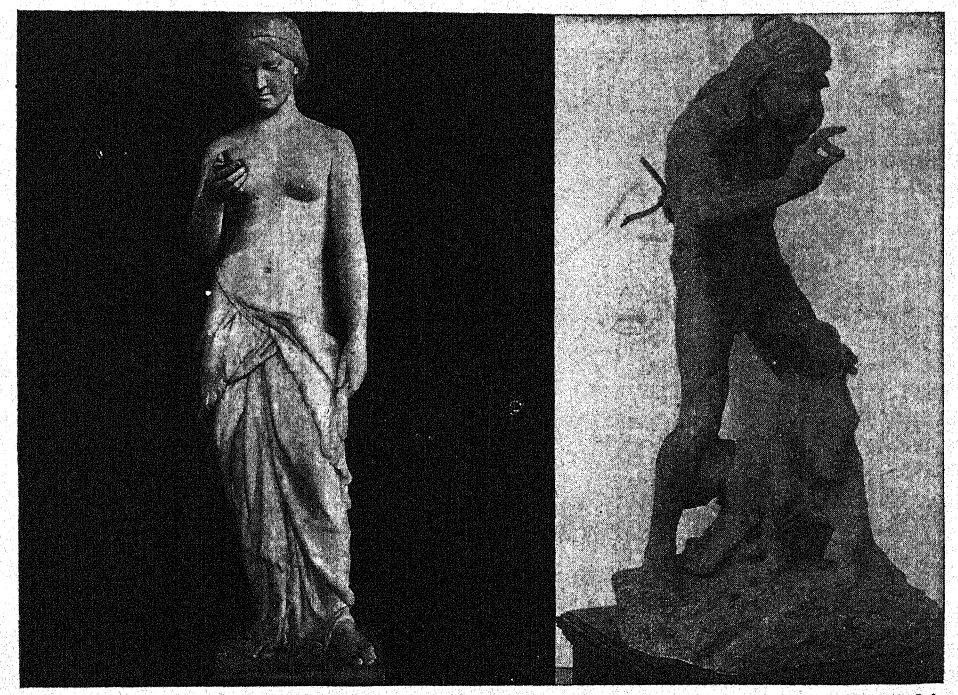
Gradually American sculptors were coming into their own. They had feasted eye and spirit on ancient sculpture. They had learned their craft in foreign studios. The people, too, were becoming more appreciative. Copies and photographs were familiarizing them with antique sculpture, and they began to enjoy its beauty. It no longer antagonized them. Sculptors began to discover that they could find success at home.

THE SON OF A JUDGE BECOMES A SCULPTOR

For many years William Wetmore Story enjoyed high international rank. During his long residence in Rome, this brilliant and versatile man, writer and musician as well as sculptor, added prestige to his profession. Born in Salem, Massachusetts, in 1819, he graduated at Harvard, and studied law before deciding to be a sculptor. His father was Justice Joseph Story, of the Supreme Court of the United States. He went to Rome in 1851, where his home soon became widely known as a gathering-place for the most distinguished people. Perhaps the influence of his enthusiasm and brilliant mind was even greater than that of his work. His Cleopatra, Libyan Sibyl, Semiramis and many portrait busts are among his most highly esteemed works. His statue of Francis Scott Key, author of the Star Spangled Banner, stands in Golden Gate Park, San Francisco, California. His son, Julian Story, is a successful artist and lives in Philadelphia.

Erastus Palmer, born in 1817, is one of the many fine examples among our early sculptors of irrepressible talent finding expression. He was a young carpenter in Utica, New York, self-taught in art, when he cut a cameo portrait of his wife so cleverly that it led to many

SCULPTORS OF THE PAST AND THE PRESENT



The first figure, by Erastus Palmer, is sometimes called The White Captive, though some have called it The Indian Girl. Notice its stiffness compared with Paul Wayland Bartlett's Bear Tamer, to the right. The work of the early sculptors of the United States nearly always shows this awkward stiffness.



The bust of Andrew Jackson, by Hiram Powers, is in striking contrast with the Emerson by Daniel Chester French, on the right. The sculptors feel the difference in the times as much or more than the painters do. Many of the earlier sculptors thought it necessary to show their subjects in classical dress.

commissions for cameo portraits. He is said to have made over two hundred in two years. Eye-strain caused by such fine work led him to turn to modeling in clay. A bust of one of his children, called Infant Ceres, was greatly admired, executed in marble, and exhibited at the National Academy of Design. From that time he was a successful sculptor. His White Captive, a graceful girlish figure, was considered one of the best things of the kind so far accomplished by an American. Palmer was especially successful with portrait busts of Alexander Hamilton, Commodore Perry, Washington Irving, and many others. He taught American sculptors an important lesson in self-reliance and that mastery of their art could be attained without foreign study. He was fifty-six before he saw Europe, and then he passed two years visiting the studios and treasures of foreign capitals.

THOMAS BALL, WHOSE PUPILS GENERALLY SUCCEEDED

Thomas Ball has told us in his interesting autobiography much of the conditions with which American sculptors had to contend before the Centennial Exposition. Born in Boston in 1819, the son of a house and sign painter, Thomas was employed as a boy in the New England Museum, where he found time to study drawing, engraving, and painting. His best talent, however, was for modeling, and his small figures and busts found ready sale. Shortly after his marriage, when he was about thirty, he took his bride to Italy, where they spent a happy two years learning much of his art, and enjoying the companionship of such gifted people as the Brownings and Hiram Powers. Among his most important works are the Washington in the Public Gardens, Boston; Edwin Booth as Coriolanus, in the Actors' Home, Philadelphia; the Emancipation Group, Washington; Daniel Webster, Central Park, New York. Mr. Ball has accomplished many works of different kinds, many commemorative monuments as well as imaginative pieces. Everything he did showed a vigorous grasp of his subject and a high degree of technical skill. During his long career he exercised an educating influence upon American sculpture, and many of his pupils became distinguished.

Clark Mills, born in New York State in 1815, should be mentioned for having made the first American equestrian statue. This is the Jackson Monument in Washington. Mills had a sad childhood, early fatherless, brought up in the home of a harsh uncle. At thirteen he ran away and henceforth took care of himself. He had been farmhand, lumberman, millwright, and many other things before he began modeling in clay. He was about twenty, and although he had little or no training, was quickly successful, for his friends admired his work and gave him commissions. He had true Yankee ingenuity and overcame all difficulties by experimenting until able to accomplish what he wished. Thus he discovered a way of taking casts from the living face so that he could make likenesses cheaply, and this led to many orders. His bust of John C. Calhoun was purchased by the City of Charleston and brought him a gold medal.

HOW THE FIRST EQUESTRIAN STATUE IN AMERICA WAS MADE

The president of the committee having the erection of the Jackson Monument in charge, invited Clark Mills to submit a design for it. He had never even seen an equestrian statue, yet, undaunted, he set to work and his design was accepted. The committee furnished the bronze from old cannon captured by General Jackson, and Mills contracted to do the work for $12,000. A replica, that is, one just like it, is in New Orleans. It is a bad statue, and looks like a rocking-horse, but it is a monument to Yankee enterprise and skill. From that time he was fully and successfully occupied. He modeled a large statue of Washington, now in the national capital, and cast Crawford's Liberty in bronze. If you wish to see how the statue of Liberty looks, ask your father to show you one of his Liberty Bonds. On every one of them is printed a picture of this statue.

William H. Rinehart, born in 1825, son of a Maryland farmer, had a hard time learning sculpture. He was stonecutter for a time, studying art in the night schools of Baltimore. When thirty he had saved enough to go to Italy. Upon his return he found himself so unhappy that he soon went back to Rome, where he spent the remainder of his life. Remembering his early hardships, he left money for a scholarship to help needy sculptors. By 1840 or 1850 many Ameri-

A REMINDER OF THE REVOLUTION



Just before the Revolution, the citizens of New England were organized into bands of Minute Men, who were ready to resist the British at a moment's notice. This fine statue by Daniel Chester French stands in Concord, Massachusetts, where, on April 19, 1775, the Minute Men resisted the British, leaving their ploughs to seize their guns. In another place you may read Longfellow's stirring poem of Paul Revere, who rode out from Boston to warn the sleeping farmers that the British were coming to destroy the military stores that had been collected.

can sculptors were accomplishing creditable work if not as distinguished as that which was to follow.

A WOMAN ENTERS THE FIELD OF SCULPTURE

We have one famous woman sculptor of this early time—Miss Harriet Hosmer. Born in Watertown, Massachusetts, 1830, she was a frail child, and her father, a physician, encouraged her in tomboy ways, hoping to make her strong. Harriet rode and rowed, hunted and skated, made collections of eggs and bugs, and had a free, happy time. She studied drawing and modeling with a Boston artist, and then, because anxious to study anatomy, went to St. Louis, where the Medical College was one of the few institutions of the kind then admitting women. In 1852 her father took her to Italy and there for seven years she studied in Rome. She soon became a distinguished sculptor and figure in the art world. Her little figure of Puck was immensely popular, and she was called upon for many copies of it.

Important names thicken in the history of American sculpture. It is impossible to give many of them even brief mention.

THE MAN WHO MADE A GREAT WASHINGTON

One of the first sculptors who broke away from the Italian influence was Henry Kirke Brown, born in Leyden, Massachusetts, in 1814. Though he studied in Italy, his later work is strongly American. His best work is the statue of Washington on horseback, which is in Union Square, New York. The greatness of his subject seemed to inspire the artist, and this work is much superior to his other statues.

John Quincy Adams Ward, born in Urbana, Ohio, in 1830, had the childhood of a farmer's boy. His first modeling was the figure of an old negro done with clay from his father's farm. While visiting in Brooklyn he became a pupil of H. K. Brown, and worked with him for seven years. He helped to make the Washington statue of which we spoke above. He could not have fallen into better hands, for under Mr. Brown's careful training he became an expert in handling both marble and bronze. His Indian Hunter, now in Central Park, was his first noteworthy work. Of his many achievements his Freedom is perhaps the best known. In 1896 Mr. Ward was elected president of the National Sculptors Association. His statue of Washington on Wall Street is shown in another place. He perhaps made more portrait statues than any other American sculptor. Though he lived to be eighty years old he worked to the last, and his work showed no signs of loss of skill.

HOW TEACHING HAS BEEN PASSED DOWN

Daniel Chester French, one of our most highly esteemed sculptors, was born in Exeter, New Hampshire, in 1850. Miss May Alcott, so well known as the Amy of Little Women, gave him his first lessons in modeling, for which she lent him her tools. He was nineteen then and had discovered his talent in carving turnips. His father and stepmother gave him every encouragement, and he had later the great advantage of studying in the Brooklyn studio of J. Q. A. Ward.

THE MINUTE MAN, WHICH CATCHES THE SPIRIT OF NEW ENGLAND

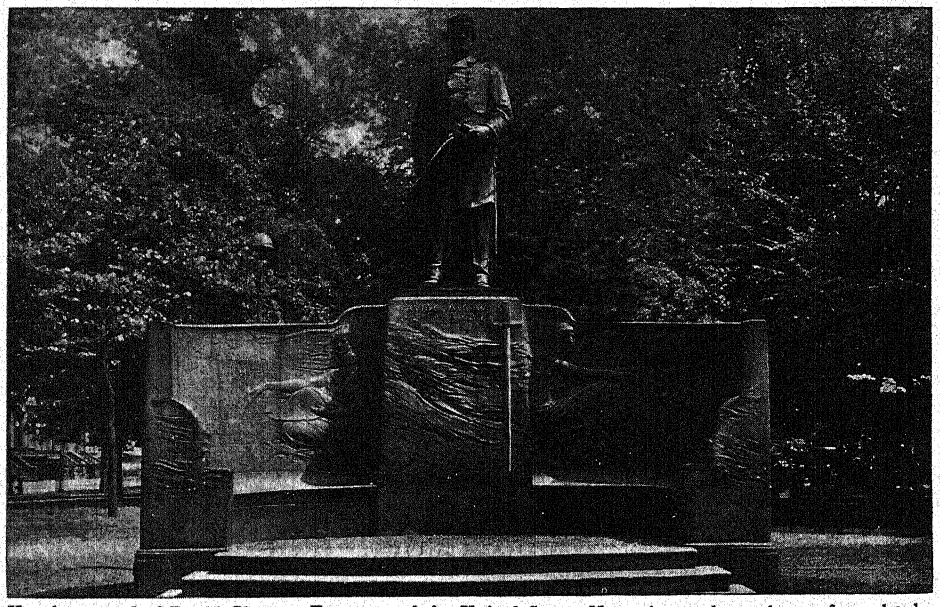
He was only twenty-three when he accomplished successfully his first important commission—The Minute Man, which stands in Concord, Massachusetts, to mark the site of the battle of Lexington. Among his achievements are the Gallaudet Group, showing the famous doctor of the blind teaching tenderly a little pupil; the statue of John Harvard at Harvard University; the Alma Mater at Columbia University; The Angel of Death and the Young Sculptor. He excels, too, in portrait heads. He has done some important pieces in collaboration with Edward C. Potter, the distinguished sculptor of animals. Mr. French's work is noted for serene beauty and distinction, and for a quality finely sympathetic which endears it to the general public.

Gradually Rome ceased to be the one place for which all young sculptors longed. For many years now they have been going to Paris, more and more, to the Ecole des Beaux Arts and the studios of Parisian sculptors. America is justly proud of Augustus Saint Gaudens, by critics generally ranked as our greatest sculptor. In him seemed to flower the accumulated influences of foreign craftsmanship, with striking individuality. He combined the sympathetic imagination and large conception of a poet with marvelous mastery of technique.

TWO FINE STATUES IN NEW YORK'S PARKS



The Indian Hunter, by J. Q. A. Ward, is one of the best statues in Central Park. Every muscle is tense as the hunter crouches, awaiting the moment to loose his half-wild dog and bound forward after the game. One expects the figure to come to life at any moment. This is one of Ward's earlier works, and is said to be the first statue erected in the park, which now has so many.



You have read of David Glasgow Farragut, of the United States Navy, in another volume of our book. Augustus St. Gaudens has represented him as he would stand on board ship. The pedestal, which adds much to the impressiveness of the figure, is by Stanford White. The figure stands in Madison Square, surrounded by high buildings, though you would not guess it from the trees in the background. Perhaps more people in the United States have seen work by St. Gaudens than by any other American sculptor.

SAINT GAUDENS, AMERICA'S GREATEST SCULPTOR

Saint Gaudens was born in Dublin, Ireland, in 1848. His mother was an Irish woman, his father a French shoemaker. They came to the United States when Augustus was a baby and finally settled in New York. At thirteen he was apprenticed to a cameo cutter, with whom he worked for several years, devoting his evenings to the drawing classes at Cooper Union and the Academy of Design. All his life he was a tireless worker. When nearly twenty he was able to go to Paris, where with other men of genius he studied in the studio of Jouffroy. After three years in Paris, he went to Rome for three years more. In 1874 he returned to America and henceforth devoted himself to the important commissions which crowded upon him. For many years his studio at Cornish, set in the beautiful, rugged New Hampshire country, stood to American sculptors for the highest in ideal and craft. The amazing amount of his achievement, his unhalting succession of important works, show unvarying enthusiasm and power of concentration. Among his most representative pieces, making fine appeal both to cultivated and to ignorant people, are the Admiral Farragut in Union Square, New York; the Shaw Memorial in Boston; his Lincoln and Sherman; his relief of Robert Louis Stevenson; the poignant figure of Grief in the Adams Memorial, Rock Creek Cemetery, Washington; the grim old Puritan, Deacon Chapin; the buoyant Diana on the tower of the Madison Square Garden, New York. In all his work—low relief, statues, portraits, monuments—he has known better perhaps than any other American sculptor, how to touch the heart in revealing both the material and spiritual beauty of his subject.

A MAN WHO IS AT HIS BEST IN PORTRAITS

William Ordway Partridge is not only a sculptor, but in writings and lectures a distinguished teacher of his art. Born in 1861, a graduate of Columbia University, he studied in Paris and Rome. His talent, enriched by liberal education, has found refined and vigorous expression. Perhaps his portrait busts of Shakespeare, Tennyson, Shelley, Burns, Whittier, and many others, in their widely different interpretations of character are as fine as anything Mr. Partridge has achieved. Two portrait statues stand on the grounds of Columbia University in New York City. They are Alexander Hamilton and Thomas Jefferson, and both are much admired.

THE MAN WHO ALWAYS LOVED TO MODEL ANIMALS

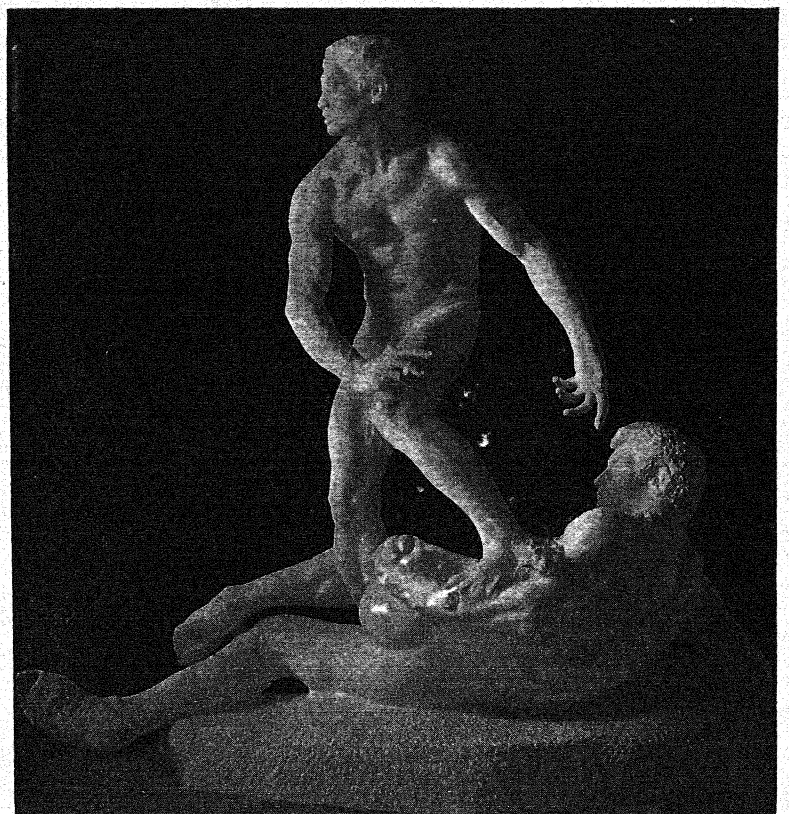
Paul Wayland Bartlett may be said to have inherited his talent; for his father was a sculptor and also a distinguished art critic. Paul was born in Boston in 1865. He received his training at the Ecole des Beaux Arts, Paris, which he entered at fifteen, working very hard, but finding time to attend a course on animal sculpture at the Jardin des Plantes. It was necessary for him to earn his own living from an early age, and this he did by making clever little models of animals. This early work is somewhat freakish and grotesque. Later he accomplished some finely dramatic models of animals, among which his Dying Lion and the Bear Tamer are highly esteemed.

He is a master in the art of bronze casting and his collection of bronze bugs, fishes, and reptiles attracted much attention in the Paris Salon of 1895. Among the important commissions he has executed are two of the circle of bronze effigies in the rotunda of the Congressional Library. His Columbus and his Michael Angelo are among his noteworthy works. They show the imaginative realization of the great sculptor, and the great discoverer, as well as a splendid vigor of execution. American visitors to Paris have reason to be proud of the young American sculptor whose equestrian statue of General Lafayette in the Place du Carrousel has been highly commended by leading sculptors at home and abroad.

THE MAN WHO WORKS HARD ALL THE TIME

George Gray Barnard is often claimed as our most original sculptor. He is distinctively American, seeking to reveal the greatness and promise, the crudity too, perhaps, of his native land. He is an out-of-door man. Born in 1863, in Iowa, much of his youth was spent roaming about the country studying the ways of birds and beasts and trying to model these in the local clay. Finally he went to Chicago, where for a time he

TWO GROUPS THAT HAVE PECULIAR SIGNIFICANCE





The group on the left is by George Gray Barnard and is entitled The Two Natures in Man. It represents the constant struggle between bad and good which goes on in every one of us, and in this struggle sometimes one conquers and then the other. The Memorial to Edgar Allan Poe, perhaps the greatest poet the United States has yet produced, which stands on the right, is by Richard Hamilton Park. Both may be seen in the Metropolitan Museum of Art, New York City.

worked with an engraver and then decided to become a sculptor. He entered the Chicago Art Institute and while there made a child's bust for which he was paid $350. With this small sum he went to Paris, where he lived in seclusion, working hard and living meagrely until he fairly earned success. In 1894 he was ready to exhibit his works, which aroused great interest and admiration. Those who clung to conventional methods were somewhat repelled by his daring innovations, but always his vigor and daring has won respect. Among his best known works are Brotherly Love, the Two Natures; the Hewer. He has for some years been engaged upon the sculpture for the Capitol of Pennsylvania.

He has modeled a statue of Lincoln for the city of Cincinnati, which has been much discussed. Some people say that he has made the great president look like an uncouth clown, while others see the soul of the great man under the unpleasing exterior. A copy of this statue was presented to the city of London.

TWO BROTHERS WHO HAVE WON RECOGNITION

Another of our younger sculptors, Solon Borglum, has won his fame by choosing characteristically American subjects. He was born in Utah in 1868, where his father—who had started life as a Danish wood-carver—had become a successful American physician. Solon had a wild and picturesque youth, roaming over the western prairie, becoming intimately acquainted with Indian life, and an expert cowboy on his father's ranches. For years he was a nomad, drifting rather aimlessly about the western country between Utah and the Pacific coast. At last he decided to study art, and with $64 in his pocket, went to Cincinnati. He excels in portraying animals and is master of the technical difficulties in conveying sense of action. He may be called the sculptor of the virile West and all that he does is stamped with the romance of the frontier. On the Border of White Man's Land, Stampede of Wild Horses, the Lame Horse, the Last Round Up, are among his important works.

His brother, Gutzon Borglum, has also won fame, chiefly by his monumental and ecclesiastical works. His colossal head of Lincoln is wonderful, and he has also done the Twelve Apostles for the Cathedral of St. John the Divine on Morningside Heights in New York City. The immense group called North America was made for the building of the Bureau of American Republics.

The Middle West has produced several of our best known sculptors. Charles H. Niehaus was born in Cincinnati, Ohio, of German parentage. He very early showed skill in drawing, and after studying at the Cincinnati School of Design went abroad to Munich. There he won prizes and received commissions so that he returned to this country well on the road to success.

THE YOUNG SPY OF THE REVOLUTION —SHOWN IN ANOTHER PLACE

Frederick Macmonnies stands in the van among our distinguished later sculptors. He has already shown amazing versatility in choice of subject as well as great technical skill.

Macmonnies was born in New York in 1863, the son of a Scotch business man. He was a sixteen-year-old clerk in a jewelry store when his talent for modeling became known to Saint Gaudens, who took him into his own studio. No better fortune than such a master could have befallen him. He proved a diligent pupil, working also in the night classes at the Academy of Design and the Art Students' League. Then he went to Paris to the Ecole des Beaux Arts. His work was aggressively bold and independent and from the start attracted attention as of great promise. In 1885 he took the highest prize open to foreigners. His first big piece of work, a Diana, won a mention at the Salon. It led to an order for the three bronze angels now to be seen in St. Paul's Church, New York. One of his most popular works is the statue of Nathan Hale, young martyr of the Revolution, bound, at the moment of his execution. It has called halt to many men and women hurrying through City Hall Park, New York. Macmonnies knows clearly what he wants to show. Of Nathan Hale he said:

"I wanted to make something that would set the bootblacks and little clerks around there thinking—something that would make them want to be somebody and find life worth living."

Macmonnies excels in vigor. His Bacchante suggests the joy of life to the most unthinking. The Columbian Foun-

tain, made for the World's Exposition at Chicago, is one of his successes. He was twenty-seven when this commission, with $50,000 to carry it out, was given him upon the recommendation of Saint Gaudens. He has modeled many other groups and monuments besides several equestrian statues.

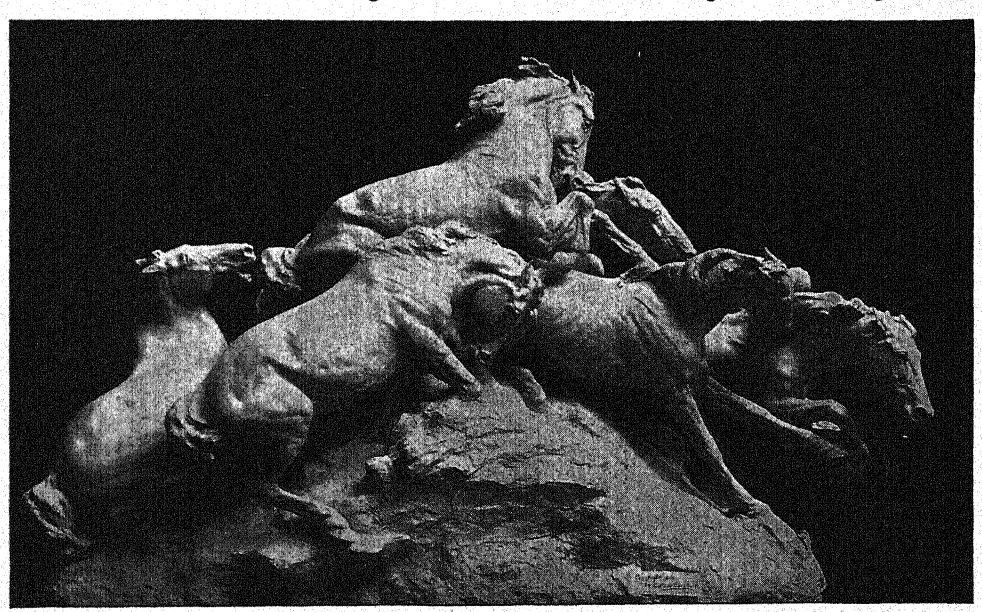
A MAN WHO MADE BEAUTIFUL DOORS

Herbert Adams, born in Vermont, in 1856, modeled the wonderful bronze doors of St. Bartholomew's Church in New York and two others for the Congressional Library in Washington. He has done many memorials for churches and has also made some portraits. The Bryant statue, which we show on page 5262, is his work.

He is no less noted for his imaginative statues of beautiful women. The most noted are St. Agnes, Primavera, the Rabbi's Daughter, and one of the young woman who afterward became his wife. All his work is graceful, and executed with marvelous delicacy. He has been compared to the sculptors of the Italian Renaissance.

SOME OTHER MEN WHO SHOULD BE NAMED

There should be named Karl Bitter, who planned the sculpture for the great Expositions at Buffalo and St. Louis. Much of his best work is in the decoration of public buildings. He has also done several portrait statues which show both skill and talent of a high order. Then there is Lorado Taft, who is helping to make Chicago beautiful. The Spirit of the Great Lakes, and the Fountain of Time are two of the groups. We might go on to mention E. V. Valentine, F. W. Ruckstuhl, Bela L. Pratt, O. L. Warner, and many others. Nor must we forget Frederic Remington, who is better known as a painter, but whose figures of Western life are interesting. These are generally very small, statuettes in fact, but the cowboys, Indians and horses are beautifully modeled, and are full of life and feeling.

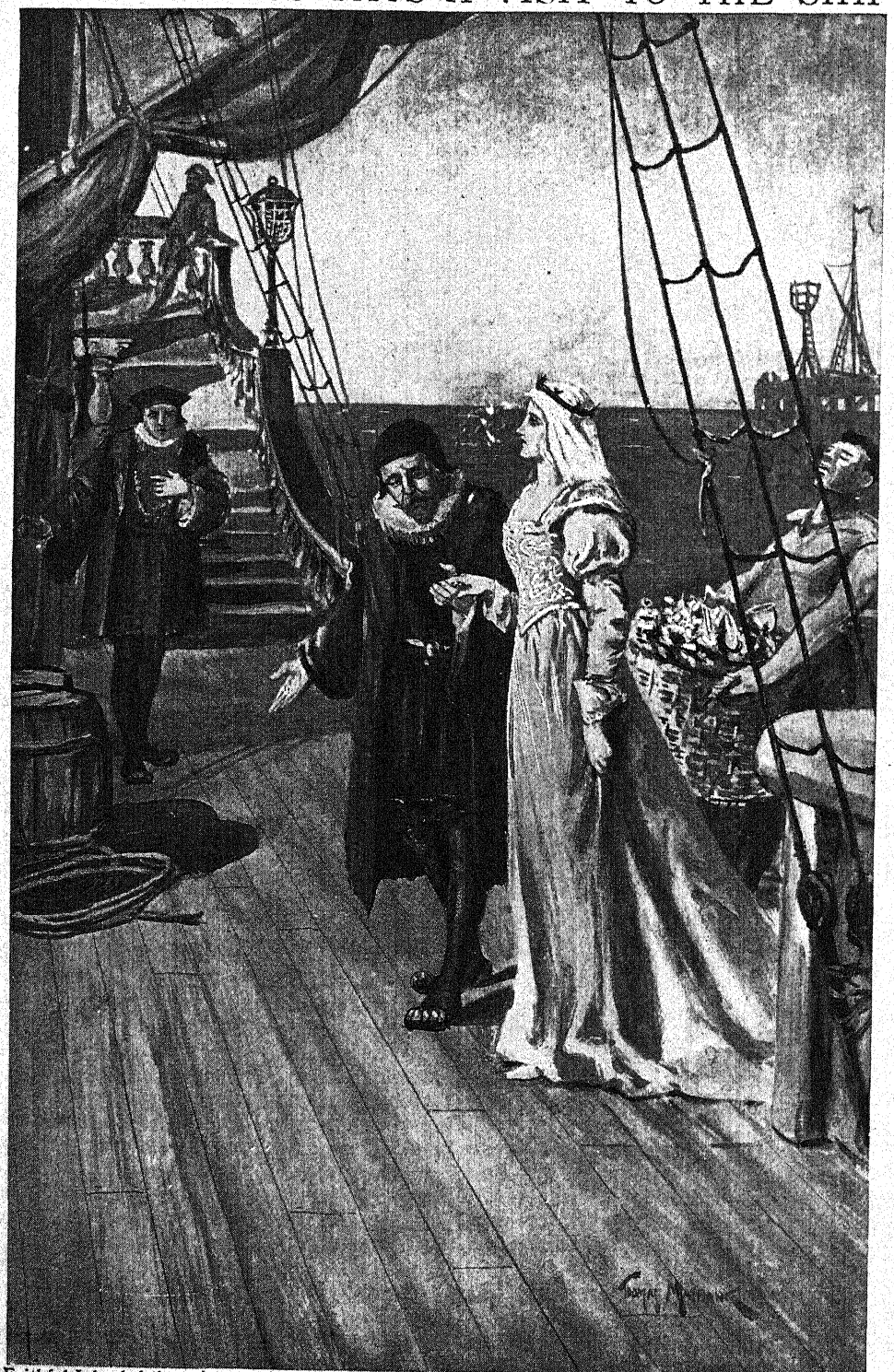


There is an old Greek story of a King Diomedes who fed his mares upon human flesh until they became so savage that no one except their owner dared approach them. Finally Hercules, or Heracles, as he is called in Greek, slew Diomedes and tamed them. This group, by Gutzon Borglum, is in the Metropolitan Museum of Art, New York. Copyright by Gutzon Borglum. Reproduced by special permission.

We have many able sculptors now. In studios and art institutions at home and abroad they have learned the mastery of their art, how to handle clay and marble and bronze. They trust their own inspiration and have ceased to be slavishly obedient to the art traditions of the Old World. They are developing all over this great country an understanding of the value of sculpture. They are ennobling and beautifying our public buildings and the parks and squares of our cities with many noble examples of genuinely American art.

THE NEXT STORY OF THE UNITED STATES IS ON PAGE 4735.

THE PRINCESS PAYS A VISIT TO THE SHIP



Faithful John led the princess, the daughter of the King of the Golden Roof, triumphantly to the ship to view the golden wares, and when the king saw her he thought his heart would leap out of his breast with joy.



THE STORY OF FAITHFUL JOHN

CONTINUED FROM 4538

AN old king who was dying summoned his best-loved servant, whom he had named Faithful John, because he had served him so well.

"Faithful John," said he, "I am about to die, and I wish you to teach my young son all he should know, and be as a father to him."

"I will serve him faithfully," was the reply, "even at the cost of my life."

"You must show him the whole palace, all the rooms and treasures; but beware how you show him the room in which hangs the picture of the daughter of the King of the Golden Roof. If he sees it he will fall deeply in love with her, and be in great danger."

After the old king's death, Faithful John said to his young master: "Come, I will show you your father's palace." Then he showed him all the treasures and all the rooms, except the one wherein hung the picture. Now, when the young king saw that Faithful John always passed the door of that room, he said:

"Why do you not open that door?"

"You would be terrified if I did," replied Faithful John.

"I must know what is in there," cried the king, and tried with all his strength to force the door open. John held him back, saying:

"I promised your father to beware how I showed you this room, lest what was within should lead both you and me into great troubles."

"My chief trouble will be not to enter the room," replied the king. "I shall not go away until you show it to me."

With a heavy heart Faithful John opened the door. There was the picture of the princess, and the king stood before it in silent admiration. Then he turned to his servant and asked:

"Whose is that beautiful picture?"

"It is the picture of the daughter of the King of the Golden Roof."

But the king said: "My love for her is so great that if all the leaves on the trees were tongues they could not utter it. I will risk my life itself to win her."

Poor Faithful John thought deeply for a long time, and at last said:

"All that the princess has about her, the tables, chairs, cups, dishes, all the things in her palace are of pure gold, and she ever seeks new treasures. Let us order the goldsmiths to work all your gold into beautiful vessels, into birds and wondrous beasts, and let us go disguised as merchants to seek her."

So they boarded a ship and sailed away to her country. Then Faithful

John bade the king await him, and, taking some of the golden vessels, he made his way to the palace.

Now, when the princess saw the wares she was delighted, and said: "They are so lovely, that I will buy them all."

But Faithful John said: "I am only the servant of a rich merchant who awaits me in yonder ship, which is full of the most precious golden vessels."

"Let him bring them all here," she replied. "I long to see them."

"They are so numerous that it would take many days," replied John, "and the palace could not contain them."

"Take me to the ship, then," urged the princess.

So Faithful John led her triumphantly to the ship; and when the king saw her he thought his heart would leap out of his breast with joy.

"Come down into the state cabin and view my treasures!" he exclaimed. But Faithful John remained on deck, and ordered the ship to be put off.

"Spread all your sails," he cried, "that she may race over the waves like a bird through the air."

Meanwhile, the king showed the princess all the dishes, cups, and birds, and wonderful beasts, each one singly, and when they returned on deck, and the princess saw that the vessel was far away from her home, she cried aloud:

"Alas! I am stolen by a roving trader; I would sooner have died."

"I am no trader," said the young king, taking her hand. "I am a king of as noble birth as you. I have taken you away by stealth because of my great love for you." And he told her the whole story, and she loved him.

Now, while they were sailing home, Faithful John heard three ravens, who had alighted on the ship to rest, talking, for he understood their language.

"There he goes sailing away home with the princess," said one.

"He has her not," said another; "for when he lands a foxy-red horse will spring towards him, and, if he mounts it, it will bear him away into the air, so that his bride will never see him more."

"True," said the third; "but if someone quickly kills the horse, the king is saved, but the slayer is turned to stone from the soles of his feet to his knees if he tells of it."

"True," said the second; "but even then the king loses his bride, for the golden bridal robe that lies on the couch in his palace is really made of brimstone and pitch and will burn him up."

"Alas! Alas! Is there no help?" cried the first raven.

All will be well if someone throws it quickly into the fire; but if he tells the reason, he will turn to stone from his knees to his heart," replied the second.

"But I know more," added the first raven; "for in the dance after the wedding the young queen will turn pale and swoon, and she will surely die unless someone lifts her up and draws three drops of blood from her. But if he should tell, his whole body will turn to stone from the crown of his head to the tip of his toe." And the ravens flew away, leaving John very sad.

When they came to land, all happened as the ravens had foretold, and Faithful John saved his master three times. But the young king did not know why he had acted so strangely, and condemned him to death. Then Faithful John exclaimed:

"I am wrongfully judged, for I have been ever faithful and true." And he told all that the ravens had said.

"Oh, my most faithful John!" cried the king. "Pardon! Pardon! Set him free." But John had fallen down a stone statue. The king grieved bitterly, and ordered the stone figure to be taken to his room.

Some years after, when his two little sons were playing beside him, the king glanced at the statue and sighed:

"Oh, that I could bring you back to life, my Faithful John!" To his surprise, the statue answered: "You can, O king, if you will give up your children."

The king was greatly shocked; but he thought how John had died for his sake, and he said that he would.

The statue came to life at once, saying: "Keep your children, your truth is indeed rewarded."

When he saw the queen coming in, the king hid the children and John in a closet, and tested her in the same way; and she agreed that John must be brought back to life. Rejoicing that his wife thought as he thought, the king opened the closet, and cried:

"Behold! Faithful John is indeed ours again, and we have our sons safe too." He told her the whole story, and they all lived happily together.

THE SHEPHERD MAID AND THE SWEEP

AN old-fashioned oaken-wood cabinet, quite black with age and covered with fine old carving, once stood in a parlor; it was carved from top to bottom—roses, tulips, and little stags' heads with long, branching antlers, peering forth from amid the curious scrolls and foliage surrounding them. Moreover, in the centre panel of the cabinet was carved the full-length figure of a man. He was a most ridiculous figure; he had crooked legs, small horns on his forehead, and a long beard. The children of the house called him "the crooked-legged Field-Marshal-Major-General-Corporal-Sergeant."

There he stood, his eyes always fixed upon the table under the pier-glass, for on this table stood a pretty little porcelain Shepherdess, her mantle gathered gracefully round her and fastened with a red rose; her shoes and hat were gilt, her hand held a crook—oh, she was very charming! Close by her stood a little porcelain Chimney-sweep. His face was as fresh and rosy as a girl's, which was certainly a mistake, for it ought to have been black. His ladder in his hand, there he kept his station, close by the little Shepherdess; they had been placed together from the first, and had long ago plighted their troth to each other.

Not far off stood a figure three times as large as the others; it was an old Chinese Mandarin, who could nod his head; he declared that he was grandfather to the little Shepherdess, and when the crooked-legged Field-Marshal-Major-General-Corporal-Sergeant made proposals to the little Shepherdess, he nodded his head in token of his assent.

"Now you will have a husband," said the old Mandarin. "You will be the wife of a Field-Marshal-Major-General-Corporal-Sergeant, of a man who has a whole cabinet full of silver-plate, besides a store of no one knows what in the secret drawers."

"I will not go into that dismal cabinet!" declared the little Shepherdess. "I have heard that eleven porcelain ladies are already imprisoned there."

"Then you shall be the twelfth, and you will be in good company," rejoined the Mandarin. "This very night, when the old cabinet creaks, you shall have a wedding party, as sure as I am a Chinese Mandarin." Whereupon he nodded his head and fell asleep.

But the little Shepherdess wept, and turned to the beloved of her heart, the porcelain Chimney-sweep.

"I believe I must ask you," said she, "to go out with me into the wide world, for here we cannot stay."

"I will do everything you wish," replied the little Chimney-sweep. "Let us go at once. I think I can support you by my profession."

"If we could but get off the table!" sighed she. "I shall never be happy till we are away."

And he comforted her, and showed her how to set her little foot on the carved edges and delicate foliage twining round the leg of the table, till at last they reached the floor. But, turning to look at the old cabinet, they saw everything in a great commotion; the old Mandarin had awakened, and was rocking himself to and fro with rage.

"Oh, just see the old Mandarin!" cried the little Shepherdess; and down she fell on her porcelain knees in the greatest distress.

"Have you the courage to go with me into the wide world?" asked the Chimney-sweep, taking her hand.

"I have," replied she.

And the Chimney-sweep looked keenly at her, then led her to the stove.

"Oh, how black it looks!" sighed the shepherd maid. However, she went on with him, through the flues and the tunnel, where it was pitch-dark.

"Now we are in the chimney," he remarked; "and look, what a lovely star shines above us!"

And there was actually a star in the sky, shining right down upon them, as if to show them the way. They crawled and crept till they reached the top of the chimney, where they sat down to rest for a while.

Heaven with all its stars was above them, and the town with all its roofs lay beneath them; the wide, wide world surrounded them. The poor Shepherdess had never imagined all this; she put her little head on the Chimney-sweep's arm, and wept so that the gilding broke off from her waistband.

"This I cannot endure!" she exclaimed. "The world is all too large.

Oh that I were once more upon the little table under the pier-glass! I shall never be happy till I am there again. I have followed you out into the wide world, surely you will follow me home again, if you love me."

And the Chimney-sweep talked very sensibly to her, reminding her of the old Chinese Mandarin and the crooked-legged Field-Marshal-Major-General-Corporal-Sergeant; but she wept so bitterly, and kissed her little Chimney-sweep so fondly, that at last he could not but yield to her request. So with great difficulty they crawled down the chimney, and



THEY REACHED THE TOP OF THE CHIMNEY, WHERE THEY SAT DOWN TO REST

at length found themselves once more in the dark stove.

Everything was quite still. They peeped out. Alas! on the ground lay the old Chinese Mandarin; in attempting to follow the runaways, he had fallen down off the table, and had broken into three pieces.

"Oh, how shocking!" exclaimed the little Shepherdess. "Poor old grandfather is broken in pieces, and we are the cause of this dreadful accident."

"He can be put together again," replied the Chimney-sweep. "If they glue his back together, and put a strong rivet in his neck, then he will be as good as new again."

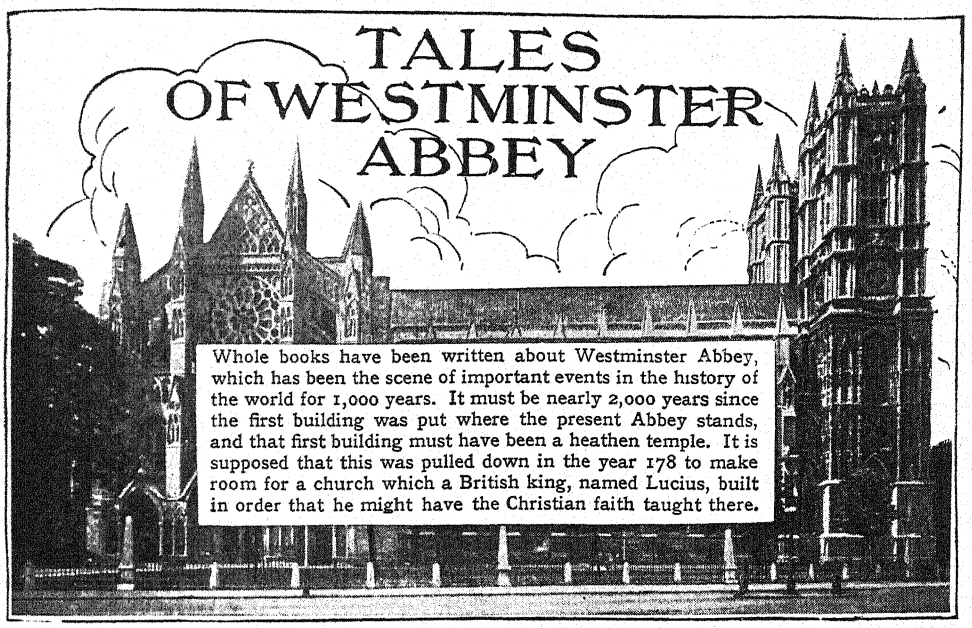
"Do you really think so?" she asked. And then they climbed up the table to their old places.

The old Chinese Mandarin was put together; the family had his back glued and his neck riveted; he was as good as new, but he could no longer nod his head.

"You have certainly grown very proud since you broke in pieces," remarked the crooked-legged Field-Marshal-Major-General-Corporal-Sergeant, "but I must say, for my part, I am unable to see that there is anything to be proud of. Am I to have her, or am I not? Just answer me that!"

And the Chimney-sweep and the little Shepherdess both looked imploringly at the old Mandarin; they were so afraid lest he should nod his head. But nod he could not, and it was disagreeable to him to confess to a stranger that he had a rivet in his neck, so the young porcelain people always remained together. They blessed the grandfather's rivet, and loved each other all the remainder of their lives.

TALES OF WESTMINSTER ABBEY



Whole books have been written about Westminster Abbey, which has been the scene of important events in the history of the world for 1,000 years. It must be nearly 2,000 years since the first building was put where the present Abbey stands, and that first building must have been a heathen temple. It is supposed that this was pulled down in the year 178 to make room for a church which a British king, named Lucius, built in order that he might have the Christian faith taught there.

HOW THE MONKS BECAME VERY RICH

THE great roadways and buildings now about Westminster Abbey were not always there. The spot was once an island in the Thames. All about it were dreadful marshes, and on the island itself were great thorny thickets, so they called the island Thorney Island. In the thickets great deer and wild oxen, of which we read on pages 405 and 412, roamed at will, and the place must have been wild and terrible indeed. Here it was, then, that a band of monks settled and built themselves a monastery, and here King Sebert, the first Christian king of the East Saxons, built his church. When the church was finished, a service was ordered for its consecration.

In course of time a great monastery grew up on the little island, and when Edward the Confessor resolved to build a church, it was here that he built. St. Peter, the monks said, appeared to him in a dream, and bade him choose that site. In 1050 he started to erect the church. Earlier kings had granted the monks certain rights, and Edward made these good and gave other rights. But he never dreamed that the church which he built would become of such importance as was to be the case. What he desired to have was simply a church which would serve as a burial-place for himself, near a great monastery, whose monks would be near at all times of the day and night to pray for his soul. The actual charters which the chapter had received gave them power and lands, but someone forged others. For hundreds of years rights, privileges, and wealth were enjoyed on account of documents said to have been written and signed by the Saxon kings. Nobody thought of questioning them until the eighteenth century. Then learned men carefully examined them, and found that many of these charters had been forged by someone after the Norman Conquest, probably in the time of William Rufus. They were found to be written in the Norman-French language, which was never heard in England until after the Saxon kings ceased to exist.

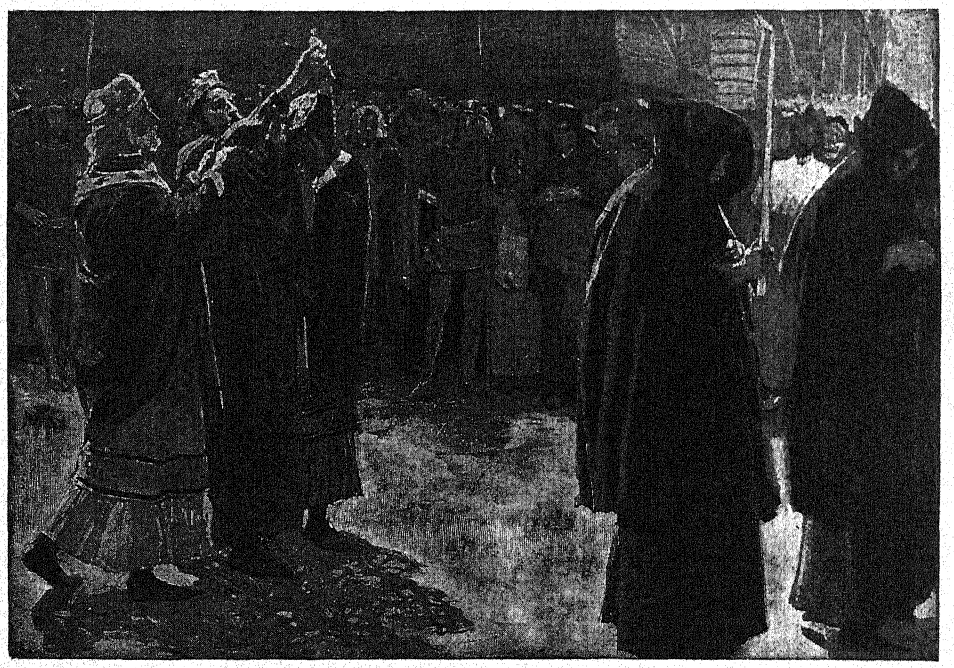
The dream of St. Peter and the fisherman had enough influence to cause the Abbey to be named after the apostle. The real name of Westminster Abbey is the Church of St. Peter in Westminster. The Abbey proper, where the abbot and all his monks lived, has long since disappeared, and the property which they owned—Hyde Park and Windsor, and many other great estates—has passed into other hands.

For a long time the Abbey was the centre of court and religious life in England. Kings were crowned in the

Abbey, their children were born within its walls. The abbots became men of great power, but sometimes their rulings did not please the people, and then the mob would rise and cause the abbot to flee. But it was only for a little time. Order would be restored, the ringleaders might be beheaded, and other rioters would be severely punished.

King after king enriched the Abbey, and the knights of Henry III. brought back to him from the Holy Land a vessel which they declared to contain some blood of the Saviour. Henry believed it. He had a great procession, and himself carried the vessel, raised above his head, all the way from St. Paul's Cathedral to the Abbey. He went on foot, dressed in humble raiment, and two bishops supported his arms lest he should stumble. The vessel was placed in the Abbey, and the king gave a great banquet to celebrate the occasion, and knighted several distinguished men.

The same king received a piece of marble which he believed bore the foot-print of the Saviour. This he placed with the vessel of blood, to be ever a treasured relic in the Abbey. Another king presented to the Abbey a girdle, which he believed to have been made and worn by the Virgin Mary.



Many English kings enriched Westminster Abbey with costly treasures. Henry III. was presented by some of his crusading knights with a vessel supposed to contain some blood of the Saviour, and he carried it himself in a great procession to the Abbey, raised above his head, as we see in this picture.

HORSES FOR NOTHING AT WESTMINSTER

MOST of the kings who helped to build or beautify the Abbey made the people pay heavily in taxes for it. But sometimes they could be generous in return. Some of them had strange notions of the way in which a gift should be presented. In 1274, when Edward I. went to the Abbey to be crowned, great crowds of people assembled about the Abbey to see him and his nobles arrive. Five hundred horsemen rode up. They were the royal princes and the great men of the land. Each rode upon a splendid great horse with magnificent trappings. It was a very great occasion, for Eleanor, the king's wife, was with him, and this was the first time that a king and queen had ever been crowned together in the Abbey. So everybody was in generous mood. Therefore, the princes and nobles who had ridden up on the five hundred great horses, after dismounting, turned all the horses loose among the crowd. Fancy such a thing

TURNING LOOSE FIVE HUNDRED HORSES

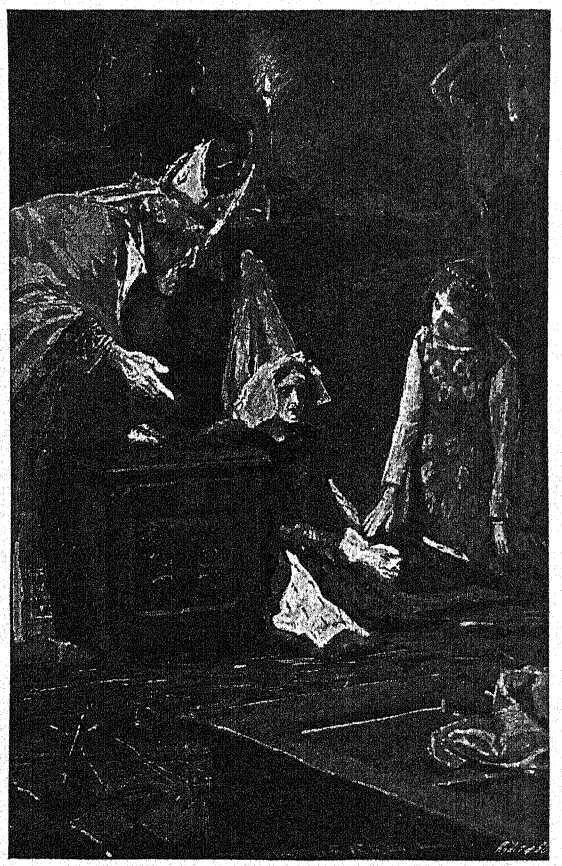


When Edward I. and his wife were crowned, five hundred princes and nobles, after dismounting, turned their magnificent chargers loose among the crowd, for anyone to catch and to keep for himself.

happening to-day! Picture five hundred battle-horses charging wildly through the crowded streets, knocking down and trampling upon the children, the weak, and the aged! This is what happened on the coronation day of Edward I., and those who caught the horses were allowed to keep them.

THE QUEEN WHO HID BY NIGHT

IN the rough-and-ready days, kings and the people were often very lawless. Men's lives were taken without trial. To be suspected or accused of having done something, or merely to be the victim of another person's wickedness, was enough to cause a man to be murdered. So the church offered protection in a special part of the building, called the sanctuary. Once arrived there, a person in danger was safe. It was a crime to refuse to allow him to enter; it was a still greater crime to arrest him while there. This protection was afforded by the law of the land until the time of James I., and although it was then abolished, sanctuary still continued to exist until the time of William III. No sanctuary was more famous than that of Westminster Abbey. Many a man's life was saved by his being able to secure shelter there until time had been given for him to prepare his defence, or the wrath of his enemies to cool down, and for him to show that he was innocent. But even so sacred a place as the sanctuary of the Abbey could not always prevent men from doing ill. Once murder was done in the sanctuary. John of Gaunt persuaded his young kinsman, Richard II., to imprison two squires in the Tower. The young men escaped and took refuge in Westminster Abbey. John of Gaunt was furious at this, and he determined to have them out of the sanctuary. He was a man; the king, his nephew, was only a boy of twelve, so John sent men to arrest the two squires in the Abbey.



The queen of Edward IV., after the death of her husband, fled for sanctuary to Westminster Abbey, with her children, at dead of night, in fear of Richard, Duke of Gloucester. Here we see her just after she arrived at the Abbey.

Fifty armed men went into the church while Mass was being said. They seized one of the squires and took him away to the Tower. The other drew his sword, and defended himself. Not until he had received twelve dreadful wounds did he yield. Then he fell dead before the eyes of the horrified monks, at the steps of the altar. This caused a great outcry in the country. Parliament refused to do its work near the scene of the shameful crime, and the Abbey was shut up for four months. The knights who led the murderers were punished, and had publicly to do penance in the Abbey for their great sin. It was from the sanctuary of Westminster that Richard, the younger of the two little princes who were murdered, went to the terrible Tower. He was the son of Edward IV. At the death of the latter, Elizabeth, his queen, felt greatly afraid of the wicked Duke of Gloucester, who afterwards became Richard III. He was the uncle of the little princes, and the loving mother knew that if he could get the two boys out of the way, he would be able to have himself made King of England. Now, Edward, the elder boy, at the

death of his father, became King Edward V. He was born in the sanctuary of Westminster, but was, at the death of his father, staying at Ludlow. The poor boy was only thirteen, but it was necessary for him to go to London to be crowned, and Lord Rivers set forth with him. But when the young king had reached Northampton, the wicked Duke of Gloucester, who desired the crown, had him seized.

Elizabeth, the widowed queen, determined that her other children should be saved. So she went at dead of night with her five daughters and little Prince Richard to Westminster Abbey, and took shelter in the sanctuary. And there she seated herself on the rushes with which the floor was covered, all desolate and dismayed at what the wicked duke might do. There, great men came to her and promised her support, and swore that her son should be king. The date of the boy Edward's coronation was fixed. The dresses of the guests were made, the banquet was prepared; but the dresses were never to be worn for that occasion, nor the banquet eaten. The duke had got possession of Edward; he now meant to have Richard, who remained still with his mother in the sanctuary. When they came to tell her that the duke insisted on her giving up her second son, the queen made a brave speech denouncing the act, and at first defied her enemies. But what could one poor woman do against an army? She had to yield. She took the little boy in her arms and fondly kissed him, saying, "God knoweth when we shall kiss together again." Then she was parted from him.

The two little princes were sent to the Tower, and the Duke of Gloucester became King Richard III. By his orders the princes were murdered. No one was allowed to speak of them while Richard lived. Long afterwards, the bones of the two poor children were found buried under a staircase in the Tower. The remains were removed to Westminster Abbey, and there they remain to this day, to remind us of the horrible crimes which have been committed in the days that are past in order to gain the crown of England.

WHEN THE TREASURE WAS STOLEN

WE have told you that forgery was committed at Westminster. Edward II. had to learn that burglars could work there also. When he traveled from his palace in London, it was his habit to leave his gold and silver and other treasures in the Abbey. He discovered, in about 1300, that some of his treasure had been stolen, but, in order not to bring disgrace upon the Abbey, he consented to let the matter be kept secret. When he went forth to war with Scotland, he left in the Abbey treasure worth $500,000, which in our time would be worth a great deal more.

While he was in Scotland, travelers from England brought him strange stories of royal treasures being sold in London, and of gold and silver plate being found about the Abbey. He caused inquiries to be made, and found that nearly all his treasure had been stolen.

The man upon whom chief blame was fastened was a pedler, but some others also were guilty. This pedler had been able to make an underground tunnel beneath some of the rooms next to the treasure room. He had taken away and sold much of the treasure; but his helpers took still more. They had a little cemetery near the Abbey, and in this they buried the stolen goods, and, in order to make it secure, they covered the ground by sowing hemp. People had seen them going out with hampers heavy with gold and silver plate. Fifty of the guilty were sent to the Tower, and the chief officials were tried.

The Crown jewels were gradually brought together again, but it was long believed that many of them remained hidden in the Abbey, and more than three hundred years afterwards a party of men set out at midnight to find the treasure.

They carried lighted candles in their hands, and had rods which they were foolish enough to think would guide them to the treasure. When they came to what they thought seemed a likely spot, they dug down six feet deep till they came to a chest, but it was only a coffin. They tried and tried elsewhere, but nothing rewarded them. A great storm arose, and the searchers thought that it was caused by demons, so they hurriedly left. If they had not done so, they said, the demons would have blown down the west side of the Abbey.

THE DUCHESS WHO SAT IN RAGS

IN the reign of Queen Anne, one of the greatest ladies at the court was the Duchess of Marlborough. Soldiers and statesmen were glad to gain her friendship because of her influence with the queen. Indeed, the duchess was for a time the uncrowned queen, for Queen Anne was for a long period very much guided by what the duchess said. What a surprise it must have been, then, for a gentleman who wrote that, when a boy on his way to school, he saw the great duchess sitting in rags and ashes in the Abbey among filthy beggars. Her son was dead, and the duchess had gone to the Abbey in sackcloth and ashes to weep for him. Around her were the beggars and gamblers and swearing loafers who at that time made the Abbey a scandal to the nation.



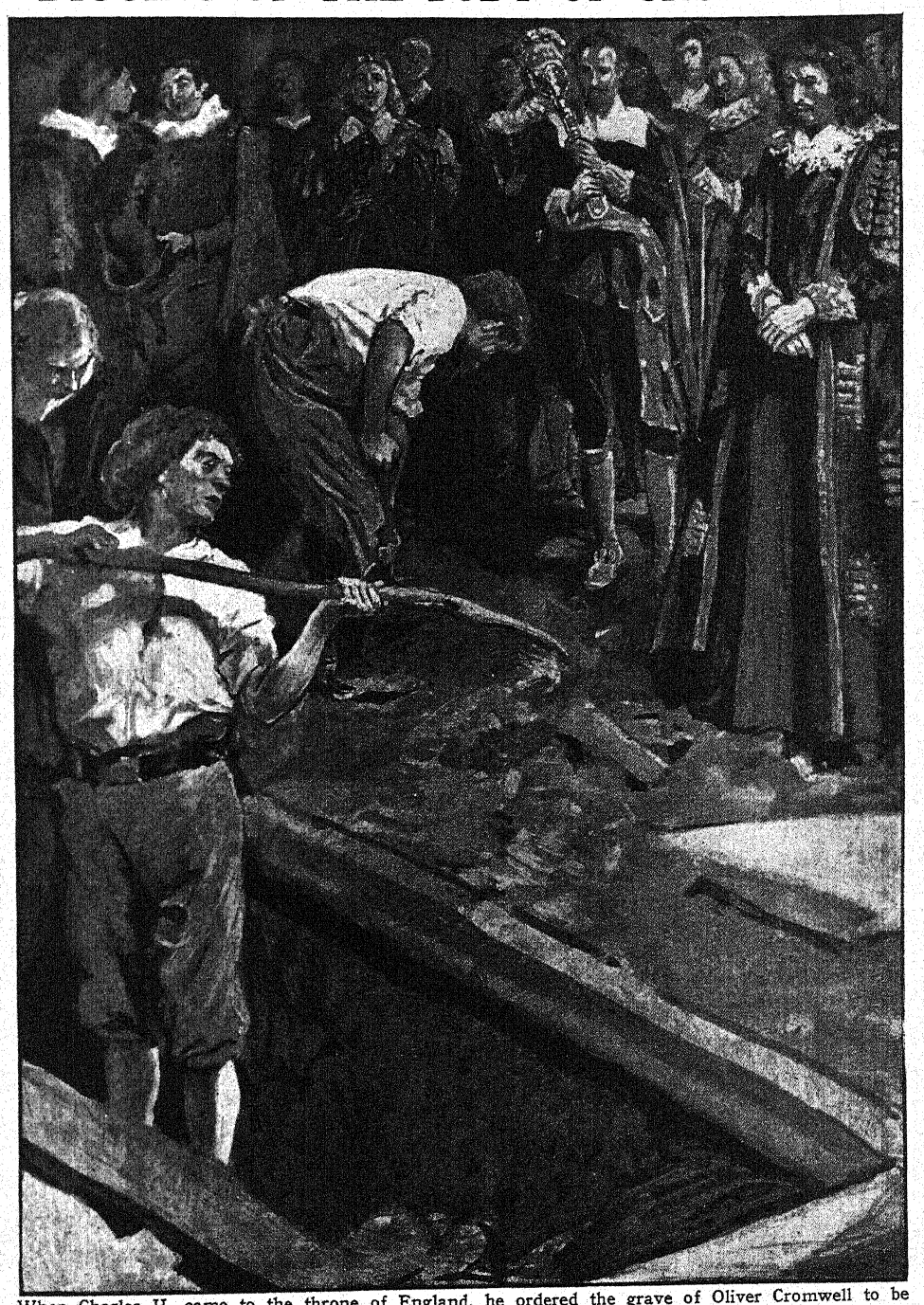
The great Duchess of Marlborough, whose husband won the battle of Blenheim and other great victories, clothed herself in rags in grief for the death of her son, and went to the Abbey to mourn him.

A KING'S REVENGE ON CROMWELL

PERHAPS the most shameful digging that was done in the Abbey happened when the bodies of Oliver Cromwell, his mother, his sister, his granddaughter, and some of his generals were dragged from their graves. They had all been buried in the Abbey. When Charles II. was permitted to return to England and was crowned, he vented his vengeance on the dead.

It is a vile thing to heap disgrace upon the dead, but the King of England did not think it too mean or wicked a thing. The bodies were dug up from their graves in the Abbey. Cromwell's body and those of Ireton and Bradshaw were dragged on sledges to Tyburn, where criminals then used to be hanged. The corpses were hanged upon the gibbet all day. Then they were taken down, and, after the heads had been cut off, they were thrown into a pit at the foot of the gallows. The heads were stuck on spears and nailed up on the top of Temple Bar, a ghastly sight for all to see.

DIGGING UP THE BODY OF CROMWELL



When Charles II. came to the throne of England, he ordered the grave of Oliver Cromwell to be opened, and his dead body to be removed from the Abbey and treated as though the Great Protector had been one of the worst of criminals. This picture shows the men carrying out the king's orders.

Charles II. was one of the worst kings who ever sat on the throne of England, and he cared nothing for the honor or the welfare of the kingdom; but he did nothing which made his name so infamous as this cruel and cowardly thing.

THE QUEEN WHO WAS TURNED AWAY

A DUCHESS could sit in rags in the Abbey, but the day came when a Queen of England was not permitted to enter in coronation robes. That queen was Caroline, the wife of King George IV. He was a selfish and mean-spirited man, and he had forced her to live alone in London while he was only the Prince of Wales. When he became king he wished to get rid of her. He offered her a great sum of money to abandon the right to call herself queen, but this she refused to do. Then he tried to prove that she was a wicked woman, and not fit to be his wife. This plan also failed. On July 19, 1821, he went alone to Westminster Abbey to be crowned. The queen had been abroad, but she had made haste to return so that she might claim her right to be crowned in the Abbey with him. The king cruelly gave orders that she was not to be admitted into the Abbey. She went early in the morning to the Abbey and demanded, as Queen of England, to be admitted. Soldiers had orders to keep her out. She went to a second door of the Abbey, but was again prevented from entering. The same thing happened when she went to a third door. Then she went home, broken-hearted, and about three weeks afterwards she died.



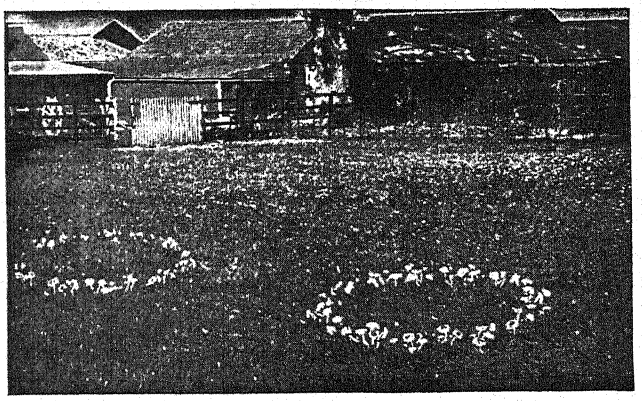
George IV. was a cruel husband, and refused to allow his wife Caroline to be crowned with him. She dressed herself in her coronation robes and tried to get into the Abbey, but by order of the king was not allowed to enter. Here we see the officials refusing to admit her into the Abbey.

THE BOY WHO SLEPT IN THE KING'S CHAIR

NOT all the stories of Westminster Abbey are so sad as some of these which we have been reading. Laughable things have sometimes happened. There was once a schoolboy who hid himself in the Abbey so that he should be locked in at night. All came about as he wished, and he *was* locked in. Now, there is in the Abbey, as we all know, the Coronation Chair, the great chair which is used only when the sovereign is crowned. All manner of curious stories are told about this chair, for there is underneath its seat the famous "Lia Fail," the stone on which the kings of Scotland were crowned. Tradition says that this stone was used in Israel.

But the schoolboy was not afraid to make himself comfortable in it. In the wonderful Coronation Chair he passed the night as snugly as in the little bed which he should have been filling. And when they opened the Abbey in the morning, they found that the young rascal had used his knife to carve upon the Coronation Chair this daring message for all the world to read: "I, Peter Abbott, slept in this chair."

THE NEXT STORIES ARE ON PAGE 4779.



WHAT MAKES A FAIRY RING?

CONTINUED FROM 4588



FAIRY rings are made of a kind of fungus. Now, it is the great mark of all kinds of fungus — including those which we can eat, and which we call mushrooms— that they contain no green matter, such as we find in grass or in the leaves of trees. It is by means of this green matter that green plants live upon the air. Those which are without it have to feed like animals, not upon the air, but upon solid or liquid things.

Animals can move to the food they want; but plants, even fungi—as we say for "funguses"—cannot. Let us suppose that these fungi start at some place in the ground, and that the old ones as they die bud off new ones all around them. The place where they started will soon have all the food taken out of it, but outside that place there will be some more food. So the new fungi can grow on the outside, but not on the inside. On the inside of the growing line the food material is constantly being used up, and so the fungi gradually die, leaving nothing behind them.

This means that a ring will be formed, and as time goes on this ring will grow bigger and bigger as the new fungi spread out in search of new soil that still contains the food upon which they can live. This is a very different explanation from what is suggested in the name fairy rings, but it has the great advantage of being perfectly true. The picture at the top of this page shows how these fairy rings grow in a field. There are numerous legends told in various parts of the world about these wonderful rings, and so, perhaps, there is some excuse for those superstitious country folk looking upon them as a kind of magic circle.

WHY DOES DAMP AIR OFTEN MAKE US ILL?

Damp air is often cold air, and the cold has usually been blamed for making us ill, though many facts prove that it is not blameworthy at all. There is one great difference between damp air and dry air, which accounts for the fact that people usually feel at their best in dry air, while many feel at their worst in damp air.

Water is always leaving our bodies by many channels, such as the skin and the breath. When the air is dry, this journey of water is readily made, but when the air is damp, it already contains a quantity of water, and so does not easily take up more, and the passage of water from our bodies is, to a certain extent, checked.

All life, as we know, is lived in

water, and if life is to go on, enough fresh water must always be supplied to the living body, no matter whether it be a man or an animal or a plant. When the passage of water is slowed, as it is in damp air, then the processes of our lives are checked, and our bodies are likely to become choked up with things which would otherwise have been burned up and got rid of. This seems to be the real key to the effect of damp air upon rheumatism.

WHY DOES A DOG GO ROUND AND ROUND BEFORE IT LIES DOWN?

The answer to this question lies in the answer to another: What is the dog? We are so familiar with animals like dogs and cats, and horses, and pigeons, that we often forget their history. Really, the dog is not a natural animal. All natural animals are wild; but these are tame—domesticated, as we say, which simply means made tame.

Now, these domestic animals very often follow the habits of their wild forefathers, though hundreds of generations may have passed since those forefathers were wild. This is a very wonderful fact, showing how things are handed on from parents to children, very largely without reference to what the outside circumstances may be.

The dog, as it turns round and round before it lies down, gives us an instance of one of these inherited habits.

As the habit is really inherited, and is natural in the dog, and has not been taught it, by itself or anyone else, we call it an instinct. If it were a thing learned by the dog, like a trick, it would not be an instinct. The dog's far-away ancestors were animals that lived in the jungle-grass, and if they wanted a comfortable bed they had to turn round and round a few times so as to level the grass.

This leads to a further question, too difficult for us to answer until we have learned more than we yet know. We might ask: How did this habit first begin? For it must have had a beginning; but how it began we cannot yet say, though we are fully aware of what happens when it has begun.

CAN OUR BRAINS EVER BE FILLED UP?

Only a few years ago it would have been said that after a certain age people's brains completely stop growing. That, however, is not quite true, because it has lately been found that in almost all of the brains, at any rate of the higher types of people, there are a certain number of cells which have not fully developed so as to do any work, and which it is believed may grow and develop even after a person is fully grown up, if he sets about the matter in the right way. However, most people use their brains just as little as they can after they leave school, and so they do not give themselves much chance of making their brains grow.

Apart from this, it is true that in some way and to some extent, varying very much in different people, the brain may become, so to speak, full up, so far as the mere memory of things is concerned. It is as if the newer traces, when they are much repeated, wipe out the marks of the older ones, or press them so deep that we cannot get at them.

All this, however, is a great mystery; and it is quite certain that in the case of many people there is no real limit to what the brain can do and hold. The poet Browning made his great scholar say, "No end to learning"; and this is a motto in which the wisest men have always believed. It is also certainly a motto which keeps people young, young at any age, and helps to prolong their lives.

IS A CLEVER MAN'S BRAIN LARGER THAN A STUPID MAN'S

This is not so easy a question to answer as we might suppose. It is certainly true that the higher and cleverer races of mankind have larger brains, on the average, than the lower races. But if we go more into detail than this, we soon meet with difficulties. Among people of the same race, a very clever man may have a brain which is really smaller and lighter than that of an ordinary, or even a stupid, man. This has long been a great puzzle, but it can be explained.

To weigh and measure the whole brain is a mistake, and it really cannot prove very much. It is not the whole of the brain, so to speak, that counts. For instance, there are open spaces inside all brains, and in different people these differ in size and in the weight of what they contain. Also, the amount of what may be called packing in the brain seems to vary in different people.

The things that really count are the nerve-cells found in the grey layer on the

surface of the brain. Where the brain is folded, this grey matter dips into folds, and a small, much-folded brain may really have far more grey matter than a big, rather smooth brain; also the grey matter varies in thickness in different people, and in different parts of the same brain.

If it were possible to make the test by the real thing which counts, we should not have much difficulty in finding the connection between the size of the brain and the mind. In order to do this, however, we should really have to count the number of nerve-cells in each brain. Perhaps even then we might not be wholly at the end of the question, because it is very likely that one cell is not as good as another.

WHY DOES A TUNING-FORK SOUND LOUDER WHEN IT TOUCHES WOOD?

The fact that the sound is louder must mean that more power, in the shape of sound-waves, is reaching our ears; so first we have to ask ourselves whether the thing upon which the tuning-fork rests is making the additional sound, and the answer is: Certainly not. We have to explain what happens, without for a moment suggesting that any new sound is being made anywhere, even though more sound does certainly reach our ears.

We are right when we say that the thing on which the tuning-fork rests resounds, meaning that it throws the sound which reaches it back towards our ears. The proper name for it, because it resounds, is a *resonator*.

The sound from a tuning-fork, like the light from a candle, flows out in all directions. We, of course, only hear what comes in one direction, and that is really only a very small part of the whole. The resonator increases the amount of sound that reaches our ears, but it makes nothing; and just as much as it increases the sound in our direction, so it diminishes the sound in the direction beyond the resonator.

WHY ARE SOME THINGS POISONOUS?

We could only answer this question completely and fully if we knew all there is to know about life. Plainly, unless we understand life, we cannot understand entirely why certain things cause death. But we know enough about certain great facts of life to explain why a great many poisons are poisonous. And it is deeply interesting to learn that many things which poison us also poison every kind of animal and every kind of plant—a man, a worm, an oak, a microbe. The living stuff which makes the living part of all these and all other living creatures is called *protoplasm*, and the poisons which destroy all forms of life are called "protoplasmic" poisons. Their deadly dose varies, and some of them are valuable as medicines in small doses; but there is no question as to their real nature, and it can be explained. The best-known protoplasmic poisons are prussic acid, arsenic, phosphorus, alcohol, and chloroform.

The first and most urgent need of all life is to breathe, and so we might expect these poisons to act by interfering with breathing—not so much with merely getting air into the lungs, but with the real breathing, or burning, which goes on in a muscle, a leaf, a microbe, or any other living creature. And we find that, in their various ways and degrees, the protoplasmic poisons interfere with the *oxidation*, or the burning or breathing, of the living cells.

Prussic acid, alcohol, and chloroform stop the working of the breathing-centre in the brain, and they also prevent oxygen getting loose from the red cells in the blood. They fasten it to these cells, so to speak, so that the cells that really want it are suffocated and die.

WHY ARE SHADOWS LONGER AT THE END OF THE DAY THAN AT THE BEGINNING?

This is not true, for our shadows are equally long at the beginning and at the end of the day. When the question was asked, surely the questioner was calling the beginning of the day the time when most of us begin the day by getting up. But, of course, the day begins when the sun rises, though that may be hours before we rise.

The length of a shadow depends on the height of the sun above the horizon. We can easily prove for ourselves that this must be so if we hold a light in our hand and raise it up and down, and notice how that affects the length of the shadow thrown by a pencil standing on end or by any other small object.

When the sun is low, either at the *real* beginning or at the end of the day, our shadows are longer; and if ever we had the sun right overhead, as we never do in this part of the world, our

shadow would lie about our feet. We can easily see all this for ourselves with a candle and a pencil. Thus it is in some measure possible to tell the time by the length as well as by the direction of the shadows.

WHY CAN WE HEAR BETTER WHEN WE SHUT OUR EYES?

This question is partly true and partly not true, according to what we mean by hearing, or, rather, according to what it is that we are listening to. If we are listening to music, which requires our attention, and our enjoyment of which depends upon our putting together in our minds what we have just heard with what we are actually hearing at the moment, and also with what we expect to hear a little later, then the fewer things our brain is doing at the time, the better; and we certainly enjoy the music more with our eyes closed, or with them just fixed vacantly upon nothing.

The only exception to this is when we are listening to music and at the same time reading the score. In such a case the shapes of the phrases, and so on, as they are seen by the eye on a page, help the ear to understand and enjoy the shapes of them as they are heard.

But it is very different when we are, for instance, listening to a tiresome lecture in a stuffy room on a sleepy afternoon. Instead of hearing better when we close our eyes, we shall soon find that we are not hearing at all! The brain must be more or less awake in order to hear, and where it might otherwise sleep, light pouring into the eyes will help to keep it awake. If we make experiments with bright lights and sharp sounds, we find that either of them helps us to feel the other more intensely if they are going on at the same time.

CAN AN ANIMAL THINK?

There is no doubt that an animal can feel, and that it can remember. Very often we call feeling and remembering *thinking*. Indeed, there are few words used with wider or looser meaning than just this word think. But it is specially important in this case to use the word with a precise, fixed meaning. We know that a dog can feel happy or unhappy, and that it can remember and recognize its master; but what we specially want to know is: Can a dog or any other animal *reason*? Now, reasoning, or thinking, in this proper sense of the word, is really always a case of "putting two and two together." The proper name for this is the *association of ideas*—that is, the putting together of ideas. When we begin to connect things in our minds we begin to think, and then we say that one thing makes us think of another. The best thinkers are those in whom this association of ideas is widest and richest and most varied, and who depend on deep connections, and not shallow, trifling ones, in the things thought about.

If now, as the writer believes, we study the behavior of dogs or elephants or birds, or many other kinds of animals, we find abundant proof that they do associate ideas, "put two and two together," and often act accordingly on the conclusions thus reached, just as we do. But the thinking of the cleverest animal is always about simple things, and deals only with the simplest questions. A child of two years old is a far better and deeper thinker than the cleverest animal that was ever born.

DO ANIMALS FEEL PAIN AS WE DO?

This is not a question that can be answered directly; indeed, when we come to think of it, we shall see that no one of us can really compare the amount of pain he feels with what anyone else feels. We cannot feel anyone else's pain, and so we can only judge questions like this indirectly.

Yet it is certain that animals feel pain far less than human beings do. Different kinds of human beings feel pain differently. Small babies and children are probably much less hurt than grown-up people are by the same thing, though we may be misled by the fact that grown-up people usually control better the results of pain.

Probably women are slightly less sensitive to pain than men. It is well known that, on the average, they can drink fluids hotter, or hold hotter plates, without pain, than men can. The lower races of mankind differ immensely from ourselves in this respect. For instance, an African negro will often cut and mutilate his body, and take very little or no notice of it.

So we find that animals feel pain far less than we do. The stroke of a whip, which would hurt us terribly for hours and leave a mark for days, must certainly

feel very different to a horse: and we know that a horse will contentedly eat his food and never move his head in the slightest while a vein or artery is being opened in his body.

DO BIRDS ALWAYS SING THE SAME SONG?

We do not yet know as much as we should about the songs of birds, and this is a pity, because what we do know is very interesting. In the first place, we are sure that various kinds of birds have various songs of their own, more or less as the various kinds of animals make sounds of their own.

But the more we study other kinds of living creatures, the more we find that individuals differ much as we do. We think that all Chinamen and all negroes look the same; they think that we all look the same. We think that the sheep of a flock all look the same; the shepherd knows that they differ just as we do. And birds of the same kind vary to a certain extent.

It has been noticed that certain kinds of birds change their song as the year advances. The tune is not quite the same in early spring as it is in summer. Sometimes the difference is definite, and can be expressed in terms of music.

Various interesting results are observed when a bird of one kind tries to teach its song to birds of another kind, as sometimes happens. But we do not yet know much about this. It is very remarkable, however, that young cuckoos, though they are hatched in the nests of birds of other kinds, keep their own particular kind of song.

WHY DO WE NOT GROWL LIKE ANIMALS WHEN WE ARE HUNGRY?

It is quite certain that human beings and animals feel very much the same when they are hungry. "A hungry man is an angry man." The rule is that, among ourselves and animals, anger is apt to be aroused whenever there is any interference with the most important things on which life depends. Thus, a man very soon begins to grow angry if he is choked, and especially if the smell and sight of food are not quickly followed by the taste of it.

Many years ago the great Darwin showed how animals and men express their feelings very often in much the same way. But man has the power of speech, and this makes a great difference. So, instead of actually growling when he is hungry and angry, he speaks, often showing his bad temper by the words he chooses and his tone of voice. Perhaps someone will then say to him, "Well, don't growl about it," showing that his words just mean a growl, and are really the same thing. If speech is impossible, then even human beings may growl when they are hungry, as some people do who have lost their minds, or as babies cry when they are hungry. Indeed, that is the reason why babies are born with the power of crying from the first.

Many animals, when interrupted at a meal get very angry and growl; and many human beings, especially men, behave in much the same way if they are interrupted during a meal. But we ought to learn not even to feel anger, much less show it; and then we prove ourselves human, and not animals.

WHY DOES A SHADE MOVE TO AND FRO WHEN HUNG OVER THE GAS?

If we could closely watch the air above a lighted gas-jet, we should see that it is continually in rapid motion. Indeed, so powerful is this motion that in some cases a room is better ventilated and has purer air when illuminated by gas, which keeps the air moving, though it uses the air up, than when it is lighted by electricity. Of course, the moving air strikes anything near it, such as a shade, and if the shade is light it will move.

The gases produced by the burning of gas are principally carbon dioxide and water in the form of a gas—water-vapor, as it is usually called. These gases, made by burning, are naturally very hot, and so they rise quickly through the colder air in which they find themselves, because that air, being cooler, is heavier. More than this, water-vapor is itself much lighter than air even when it is no hotter, and so that is another reason why the gases from a burning gas-jet rise quickly and disturb anything that is in their way, such as the shade hung over a gas-jet.

It would be quite possible to make these hot gases do work if we balanced some sort of a wheel in their way, just as we place a mill-wheel in the way of a stream of water, and so make that do work. But the particles of gas are much lighter than those of water, and as power depends on speed and weight, there is not really a very large amount of power in their motion.

WHY HAVE LEAVES DIFFERENT SHAPES?

The great idea which we learn to apply to every fact about living creatures is that these facts usually have uses. In this way we can explain the existence of leaves; we can explain why they are flat and thin, so that the light can pierce through the whole of them; we can explain also why they move so as to catch as much light as possible.

But in this, and in many other cases, there are certain facts which we cannot explain in terms of use. We can partly explain the shapes of some birds' eggs in terms of use. But, on the whole, as regards the shapes of leaves and the shapes of eggs, we can only give the very poor explanation that they are what they are because it is their nature to be so.

There is such a thing as chance in the world—chance has its laws, as everything has laws. This applies in many ways in the not-living world; it also applies in the living world. Every living thing is made up of a vast number of different parts, and these may arrange themselves in different ways, just as the colored pieces in a kaleidoscope may arrange themselves in different patterns. The shapes of leaves, and of the ornaments on the surface of many kinds of living creatures, can only be explained in this way.

WHY CANNOT WE BREAK AN EGG IF WE HOLD IT LENGTHWAYS?

It is not exactly true that we cannot break an egg held lengthways, but certainly it is much more difficult to break the shell when we press upon it at the ends. The answer depends upon the shape of the shell. It might partly be that the shell is made thicker at the ends, or it might be that the shell is made of threads or fibres running in a particular direction; but that is not the explanation here.

We may think of the egg-shell as made up of arches. Now, when an arch is narrow and high, it is much stronger, other things being the same, than if it is very wide.

The more upright and narrow an arch is, the more directly does the mass of it resist any pressure from above. In fact, if an arch is narrow enough, it is almost the same as a straight pillar, or column, which directly resists the weight of anything upon it. On the other hand, if the legs of an arch are wide apart, they cannot possibly resist so well, but will be apt to be forced away from each other more easily, and then the arch will break.

Now, we may look upon the egg, when we press it from side to side, as made of two wide, and therefore weak, arches. When we press, we are pressing only against the thickness of the shell, and that resists us little. But when we press the ends, we are met by narrower arches, and we are pressing not so much against the mere thickness of the shell from outside to inside as against the length of it from end to end of the egg.

WHY ARE THERE NO EARTHQUAKES IN ENGLAND?

This is not an easy question to answer, because we are not yet very certain about what lawyers call the previous question—that is, What causes earthquakes? But, at any rate, we find certain features about the build of those countries where earthquakes are commonest, such as the presence of volcanoes or of soil that is due to volcanic origin.

For instance, everyone has heard of the Messina earthquake, and knows that it occurred not far from Mount Etna, one of the most famous of volcanoes. Now, in England this feature of the build of the earth's crust is absent, and that goes some way to account for the fact that they do not have big earthquakes there.

It is probably doubtful, indeed, whether even little earthquakes are started in England. It is true that earth-tremors—that is, earth-tremblings—may sometimes be felt in England, and are duly registered by delicate instruments made for the purpose; but these have not started under English soil. The disturbance occurred elsewhere, and started a wave in the earth's crust which reached there, perhaps from the other side of the globe.

WHY DO THE LEAVES OF THE ASPEN-TREE ALWAYS SHAKE?

It is true, as we should expect, that small leaves move more readily and more often than large ones. That is what we notice if we compare the leaves of a horse-chestnut with those of an aspen or a birch. But even among small leaves, some move more readily than

others; and if we take the leaves of an aspen in particular, we shall see something about them which must help them to move as they do. It is that the little stem which carries the leaf is very much flattened from side to side, and so side-to-side movements of the leaf, which mean bending the stem from side to side, are easy.

The more we study living creatures, the more do we find use and meaning in the things they do and in the way they are made. When we are in a hot and stuffy room, we sometimes use a fan to help move the air; and, indeed, we know that even a little gentle fanning makes a very great difference while it is going on.

Now, a plant requires fresh air just as much as we do; indeed, in some ways the plant's need is greater, because not only does the plant require air to breathe, but also because the air contains part of the necessary food of all green plants.

We cannot doubt, then, that the shaking of the leaves of trees has the same effect as if the trees were fanning themselves; it moves the old air away, and brings a fresh supply to the surface of the leaves, which benefits the tree.

WHY DOES OIL MAKE A WHEEL GO ROUND MORE EASILY?

It all depends upon where the oil is put. If it be on the ground, then, though the wheel will go round when it is driven, it will not "bite," and we find that the motor-car, for instance, does not move. But there is a very useful and, indeed, all-important place where oil does make the wheel go round more easily, and also makes it last far longer. That place is the axle, where the wheel turns upon the cross-piece which goes through its centre.

Here there is rubbing, or friction, for the wheel turns, and the thing which supports it is still. The friction means that there is wear and tear and the making of heat. These things have to come from somewhere, and they come from the power of the motion of the wheel. This means that the wheel has to move more slowly, for it has lost part of its power of motion.

When we use oil we get a very smooth layer between the wheel and the axle, and that lessens the friction, and so saves the power in the wheel. Nowadays it has been found that if tiny little steel balls are used, and kept properly oiled, they save still more friction, and these ball-bearings, as they are called, are now used in all sorts of machines where it is important for wheels to run smoothly and wear long and well.

If we think of oil as made of a vast number of smooth balls, far too small to see, we shall understand that oil itself makes a kind of ball-bearing.

WHY DO WE NOT SEE THE STARS EVERY NIGHT?

The stars are shining all the time, sending light to the earth, but more than this is needed for us to see. The light they send must be able to reach our eyes, and reach them distinctly enough. By day the distinctness fails, because the sun is so bright. It has long been believed that, even in the daytime, we can see the stars if we look up at them from the bottom of a deep well. But really this is not true. People believed it without trying for themselves; and when we try we find it is not true. It is true that we can see the stars in the daytime during a total eclipse of the sun.

At night the stars are often hid for other reasons. Clouds will hide them as effectually as if we close our eyelids or draw down our shades. It is curious to think that rays of light may travel through many millions of miles towards our eyes, and never reach them because of some little obstacle in the last small stage of their journey—a cloud, a shade, an eyelid, or even some opaque thing inside the eye itself.

Fog or mist, like clouds, hides the stars also; but it is well for us to remember that, day or night, whether the sky is clear or obscured by fog or mist or the heaviest clouds, whether our eyes are open or shut, the stars are still shining all the time.

IS AN ATOM ALIVE?

Not very many years ago all but a very few wise people would have thought this an absurd question. An atom was thought to be something like a grain of sand, only far smaller, and as incapable of moving or doing anything for itself as a grain of sand appears to be. But now we have begun to make the great discovery of the building of atoms, the

discovery of "atomic architecture." And we learn that really an atom is less like a building than it is like a living creature.

It is almost a living thing "writ small." The points in which atoms are like living things are many and important, so much so that now we regularly speak of the birth and life and death of atoms, because there are simply no other words so suitable to express exactly what happens.

An atom is made of many different parts, beautifully connected together, and these are not merely jointed or cemented, like the parts of a building, but are in ceaseless motion and change, like the parts of a living body. We have found that smaller atoms are born by being separated from larger ones, just as new yeast-cells are born by budding from larger ones.

It is found, too, that atoms of different kinds last for different lengths of time; their length of life varies just as when we compare an elephant and a mouse, a dog and a butterfly. And, also, atoms "die," after they have used up too much of the power with which they were born, and their bodies go to furnish the material for fresh atoms, as in the case of living beings. We are learning, too, that atoms change according to their surroundings, as if they tried to adapt themselves, as living creatures do. All of this is quite different from the old idea that an atom was absolutely fixed and unchangeable.

CAN COUNTRY PEOPLE SEE BETTER THAN TOWN PEOPLE?

When we apply it to such a very complicated thing as vision, the word greater is rather vague, and may have various meanings. People may differ in their power of seeing things at any distance they choose in a bad light, or they may differ in their power of making out the details of things at a distance, or they may differ in the power of continuously doing the same work with their eyes without growing tired. All these differences exist in various people quite apart from any question as to the need for glasses.

If we took a hundred people, and let those that need glasses wear the most perfectly made glasses possible, we should find that all those people differed in all these respects. For instance, a man may be very much inferior to his neighbors in making out separately two stars that are very close together and almost look like one. Astronomers know very well how they differ from each other in respect of this kind of keenness. But the man who is worst at this may be able to read print on a dark night when the people who can see at long distances cannot read it at all.

These differences are not yet explained; but probably, on the whole, if country folk use their eyes chiefly to see at distances, their vision will be keenest at distances, and in the case of town people it will be the other way about. As to tiredness, the rule is generally that the eyes last longest at the work to which they are most accustomed.

WHY DOES A LUMP RISE IN MY THROAT WHEN I CRY?

The throat is a very wonderful and delicate place, with certain ways of its own that have to be carefully studied. Doubtless the reason why it is so delicate and can do such curious things is that it is, in human beings, the place of speech, which is the most marvelous of all things. So, often when people's minds and brains are not quite in order, especially in the case of youngish people, we find that they have difficulty in speaking and swallowing, and especially that they think they feel a sort of ball, or globe, rising up in the throat.

This has been known for many centuries, and this globe—only it is really not there at all—has a long Latin name. Now, when we cry we are rather in the same upset state that hysterical people are in; and, indeed, in both cases the great fact is that the person has lost his or her self-control, and the brain is not rightly looking after the doings of the body.

The special explanation of the globe feeling probably lies in the fact that the throat is really a wide tube made with walls of muscle. When we swallow, a sort of wave runs along this tube from above downwards.

When we are upset, as when we cry, the machinery gets out of order, so to speak, and probably the tube starts moving when it should not, and as it should not—from below and upwards. This makes us feel as though a ball, or globe, were rising up in the throat.

THE NEXT QUESTIONS ARE ON PAGE 4811.

WHAT THIS STORY TELLS US

A CABLE which is to run under the ocean must be much stronger than a telegraph wire which is strung upon poles. The weight of the cable with its layers of wire, and the substances put around to keep the water out, is very great. The cable lies on the ocean floor sometimes as much as four miles from the surface of the water. Though many messages are now sent by wireless, the cables are still busy, for they can be used at all times, while the conditions of the atmosphere sometimes prevent the sending of wireless messages. Then, too, a wireless message may be picked up by other instruments while a cable message is known only in the sending and receiving offices. This secrecy is sometimes very important in business, and also in the affairs of government.. Great damage might be done if another party got possession of the information intended for one person or one country alone. Cables therefore are not likely to go out of use.

THE WIRE THAT RUNS UNDER THE SEA

CONTINUED FROM 4598

ALTHOUGH the first wire under the sea was only laid about seventy years ago, there are to-day over 300,000 miles. These lines bring East to West and North to South in a way that our ancestors would have called magical. In one day 20,000 messages can be sent through a cable, at the rate of fifty to one hundred words a minute. Every mile of cable costs about a thousand dollars, and lasts from thirty to forty years.

The first real cable ever laid was the work of two men, Jacob and John Brett, who in 1849 obtained permission from the English and French governments to lay a cable across the Straits of Dover. The cable was made of copper wire covered with gutta percha, and it was unwound from a huge reel aboard a small tug-boat. But, after the first evening, it would not work. Undismayed, these enterprising men laid a stronger cable from Dover to Calais, and through this, messages were sent under the water. Two years more and a cable connected England and Ireland, and soon a number of lines followed. Many lines failed because they broke, or else lay in coils on the bottom through being paid out too slackly.

In 1857 the attempt to lay a cable 3,000 miles long across the Atlantic was made. Many people had laughed at the plan, but a few far-sighted men had taken it up, and the United States government and the English government each lent ships, first to make a survey of the route, and then to lay the cable. After two bad breaks, the first attempt failed. The next year a second expedition after three attempts succeeded in laying the entire line. On August 5, 1858, the President of the United States exchanged greetings with Queen Victoria of England.

There are eighteen cables across the North Atlantic now, and several different ones to the Far East. Of these, the All British Cable to Australasia and the American-Pacific Cable to Japan both run into the depths of four miles, while one of the sections of the Pacific Cable is 3,458 nautical miles long.

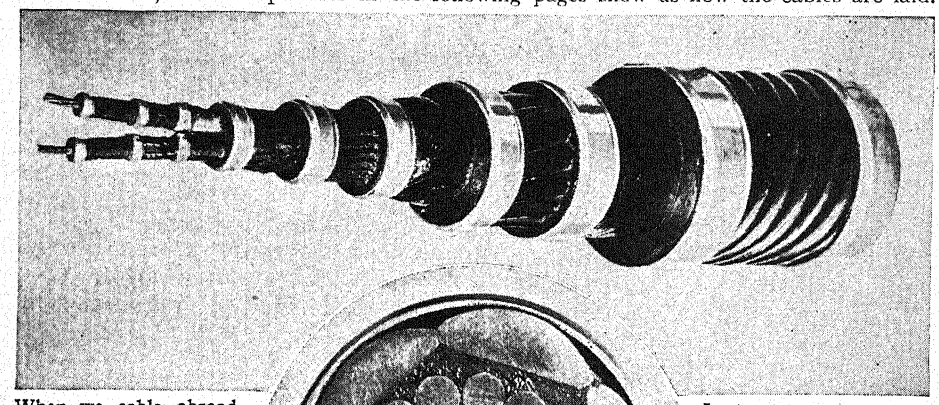
Many improvements have been made both in receiving and sending messages. When the first messages were sent, the greatest speed was only about six words a minute; through the Atlantic cables to-day the average is fifty words a minute and they can work up to just double that number. By the code system, one word stands for a number of words or a phrase, and it has the advantage of being secret also.

THE NEXT FAMILIAR THINGS ARE ON PAGE 4801.

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THE WIRE THAT RUNS UNDER THE SEA

One of the most wonderful things in the world is the way in which a thought can be flashed across the earth, quicker than a messenger can carry a letter across a town. Every day messages are sent under the sea by means of electric cables lying along the ocean-bed. The question answered on the previous page deals with this great achievement of man, and the pictures in the following pages show us how the cables are laid.



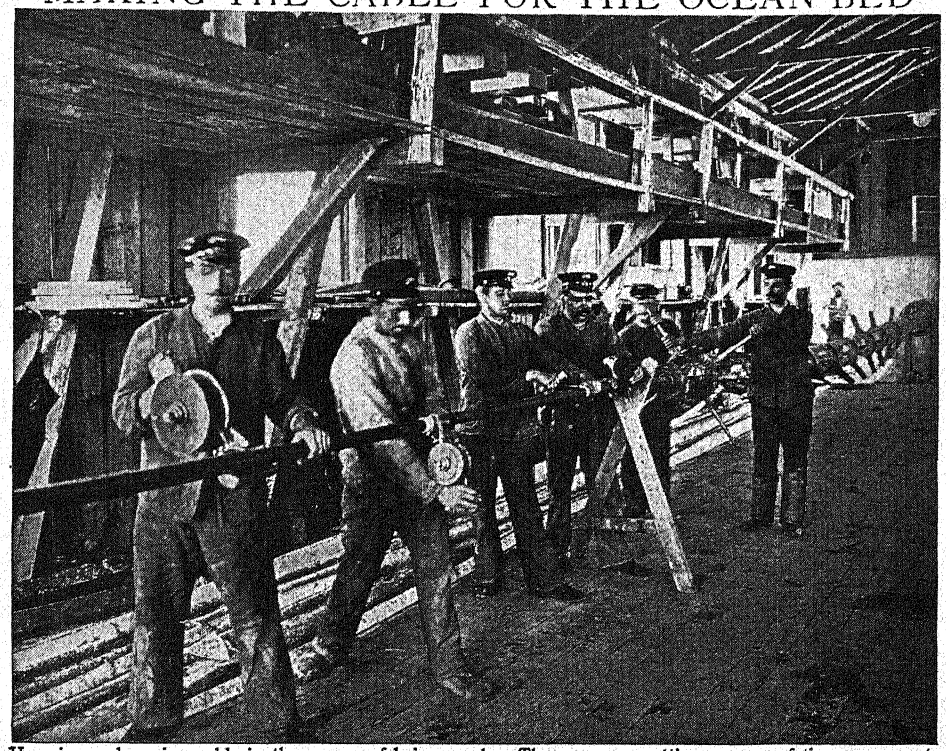
When we cable abroad, electricity carries our message through a thin wire under the sea. The wire would snap if it were not protected by coats of gutta-percha, tar, hemp, lead, or brass, and steel. A cable is thickest at its shore end

In the top picture we see a piece of cable with the different layers cut away a little to show them clearly. It is the two thin wires at one end that carry the message. The picture in a circle shows a section cut across the same cable.

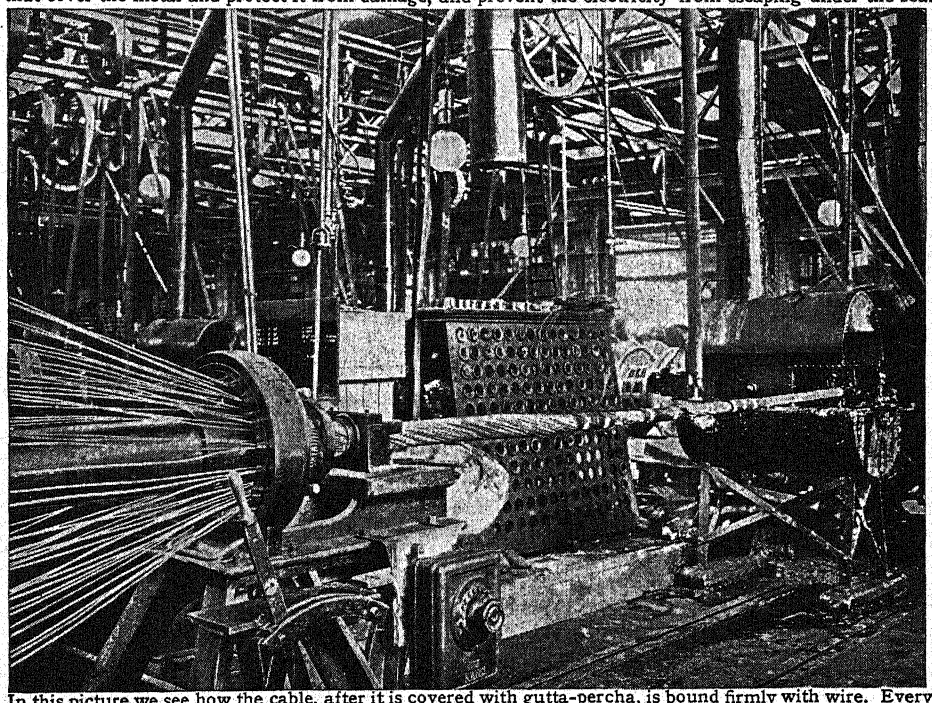


Marine plants and sea animals fasten and grow upon the cable at the bottom of the sea, as may be seen in this picture. Sometimes a cable is pulled to the surface with a large piece of coral growing all round it, or some big fish is mixed up with it. These were the greatest difficulties that the early layers of deep-sea cables had to fight against and learn how to overcome. Some years ago something went wrong with a cable near Valparaiso, in South America. When it was hauled to the surface, there was a dead whale with the cable coiled round its body. Such incidents are not uncommon, hence the need for great strength in the cable.

MAKING THE CABLE FOR THE OCEAN-BED



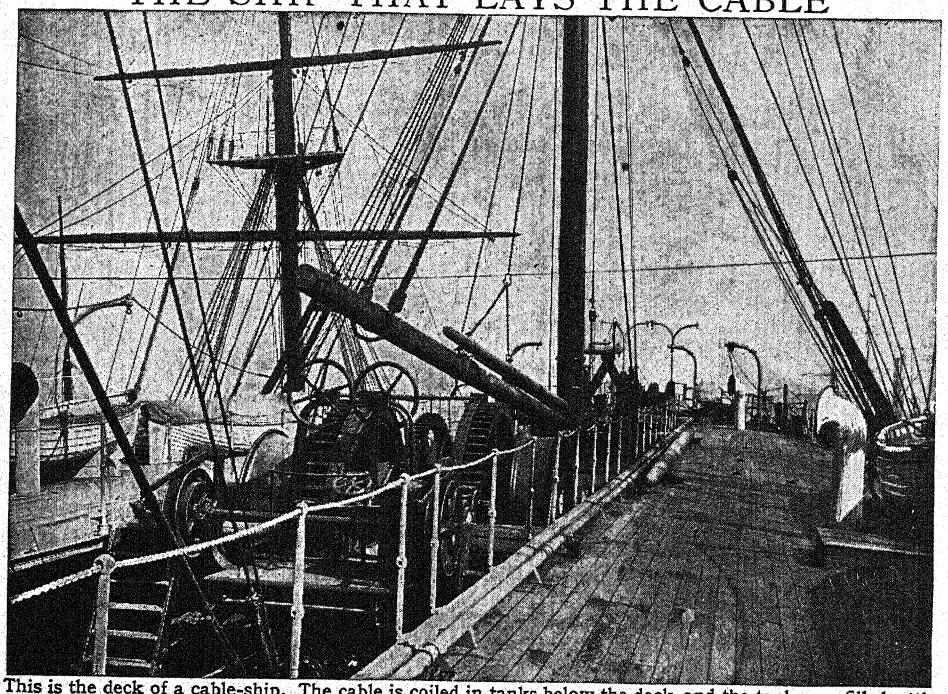
Here is a submarine cable in the course of being made. The men are putting on one of the many coats that cover the metal and protect it from damage, and prevent the electricity from escaping under the sea.



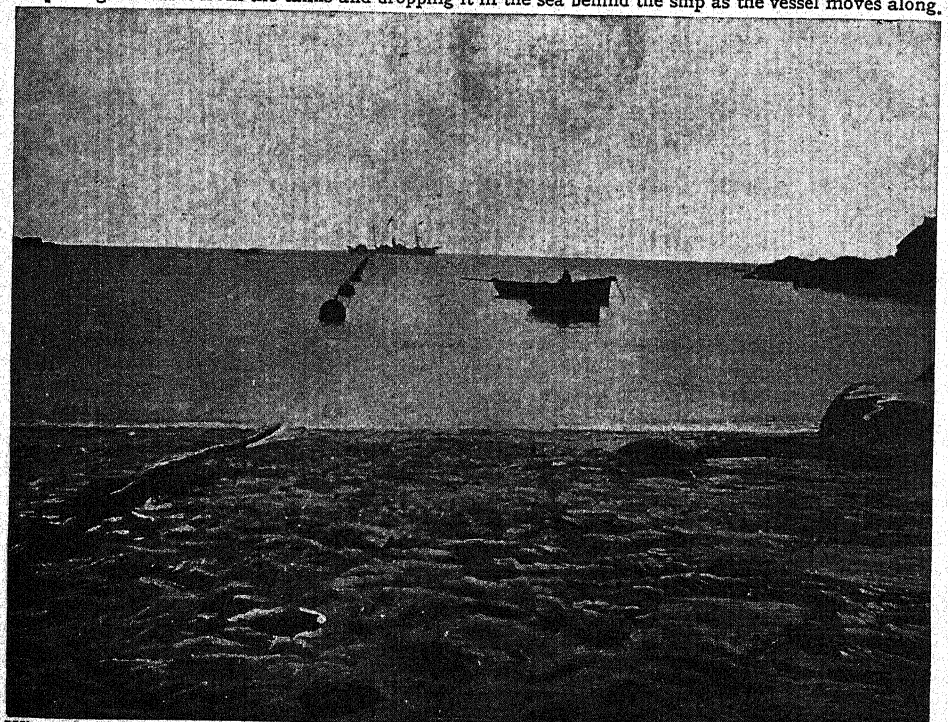
In this picture we see how the cable, after it is covered with gutta-percha, is bound firmly with wire. Every detail of the work must be most carefully done, for if there were any flaw the cable would be useless.

The pictures on this page are from Messrs. Siemens & Halske's book on the Bodensee Kabel.

THE SHIP THAT LAYS THE CABLE

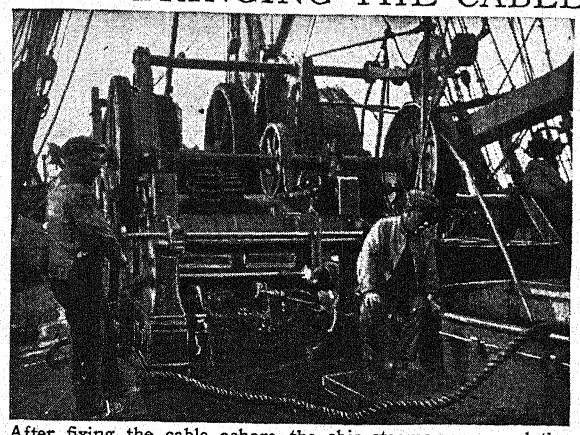


This is the deck of a cable-ship. The cable is coiled in tanks below the deck, and the tanks are filled with water to prevent the cable from becoming too hot or too cold. The machinery in the middle of the deck is for pulling the cable from the tanks and dropping it in the sea behind the ship as the vessel moves along.

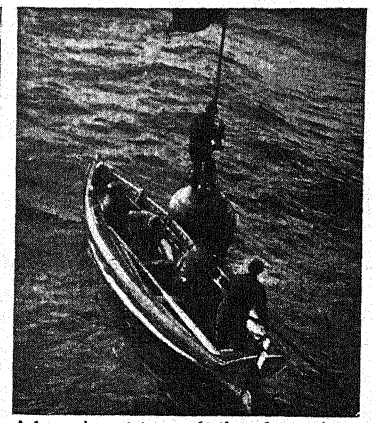


When the ship is ready to lay the cable, the end is pulled to shore by a small boat. The cable would be damaged by dragging over the sea-bottom, so it is supported by buoys, as we see in this picture. When the end has been fixed at the cable station, the buoys are removed, and the cable sinks to the ocean-bed.

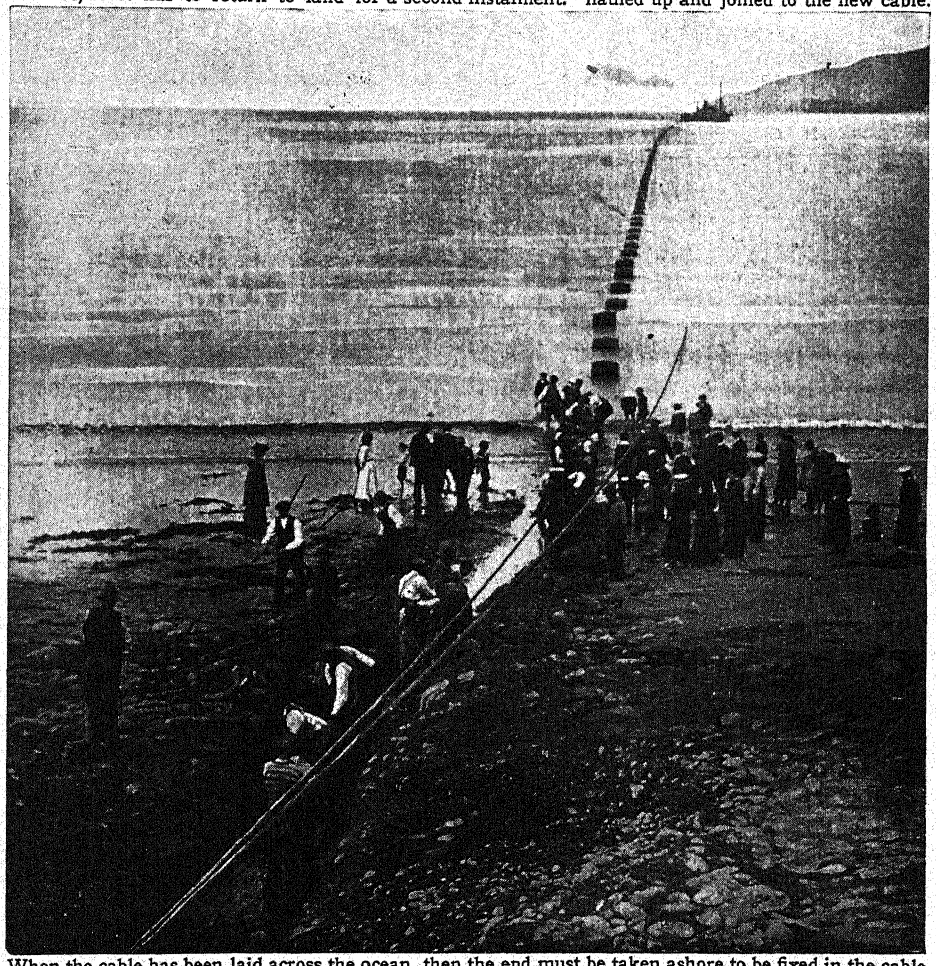
BRINGING THE CABLE TO SHORE



After fixing the cable ashore, the ship steams away, and the cable passes over a drum, as seen here, and then over the side of the ship. A vessel cannot carry a very long cable all at once, so it has to return to land for a second instalment.



A buoy is put to mark the place where the end of the cable is dropped. When the ship returns, the end is hauled up and joined to the new cable.

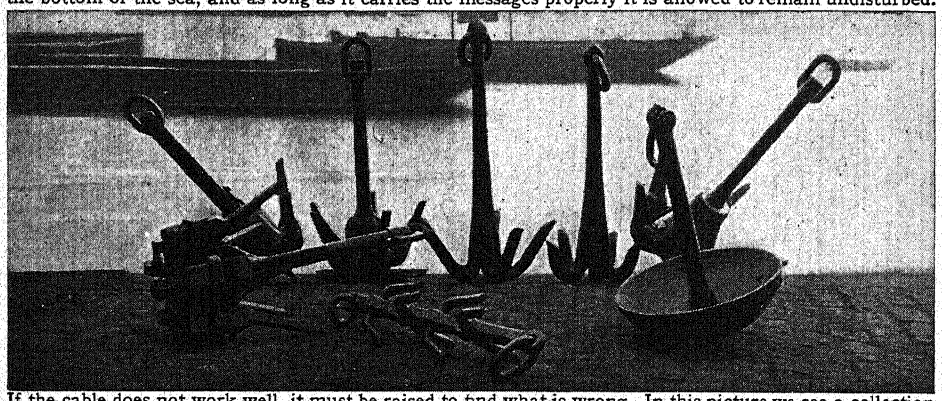


When the cable has been laid across the ocean, then the end must be taken ashore to be fixed in the cable station, just in the same way as we saw it done at the beginning of the long operation. Here the cable is seen supported on barrels from the ship to the shore, and the shore part is being placed in a trench.

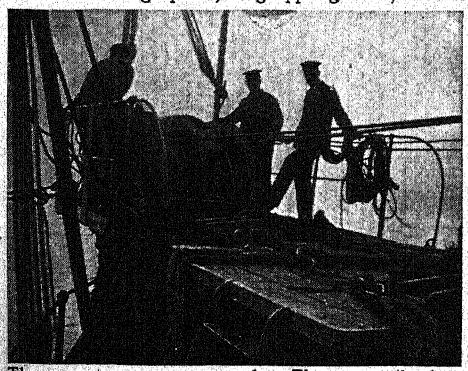
LOWERING AND RAISING A CABLE



The cable is now laid under the sea, except where it is still held by ropes from the ship. The rope which holds it is now laid across a wooden block, and a man with an axe cuts the rope. Then the cable sinks to the bottom of the sea, and as long as it carries the messages properly it is allowed to remain undisturbed.



If the cable does not work well, it must be raised to find what is wrong. In this picture we see a collection of the curious grapnels, or grappling-irons, used for catching hold of a cable at the bottom of the sea.



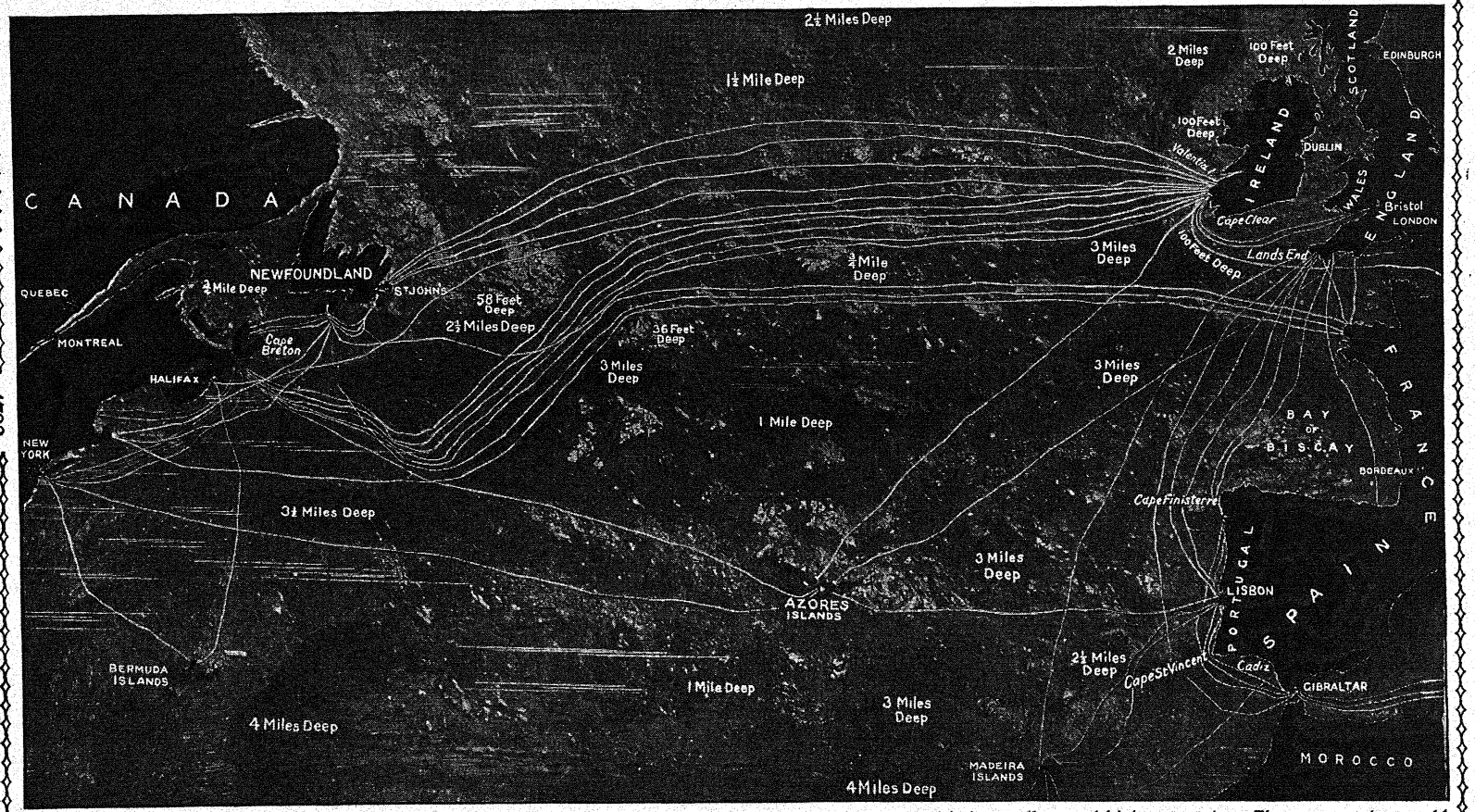
These men are using grapnels. They can tell when the cable has been caught by the grappling-iron, owing to the jerk of the rope or chain that holds it.



When a cable is hauled up, a man is swung over the side of the ship to fasten a rope to it, as shown here, and then the cable is pulled on board for repairs.

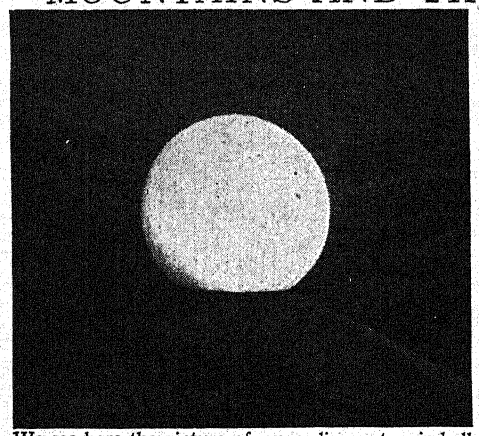
The photographs on these pages show the work of the Commercial Cable Co. and the great India-rubber Co., at Silvertown, London.

WHAT IT IS LIKE AT THE BOTTOM OF THE ATLANTIC OCEAN

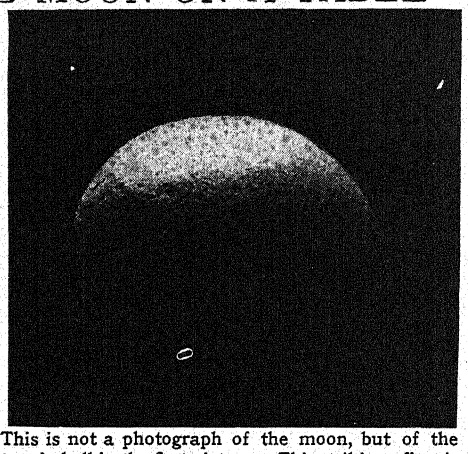


If the water in the Atlantic Ocean could be drained, the ocean-bed would look like a great stretch of country with deep valleys and high mountains. These mountains would be the islands that now only peep above the waters. Stretching across the new country we should see the many cables that enable the Old World and the New to talk together.

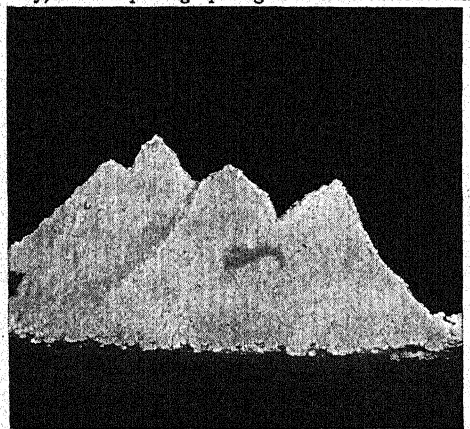
MOUNTAINS AND THE MOON ON A TABLE



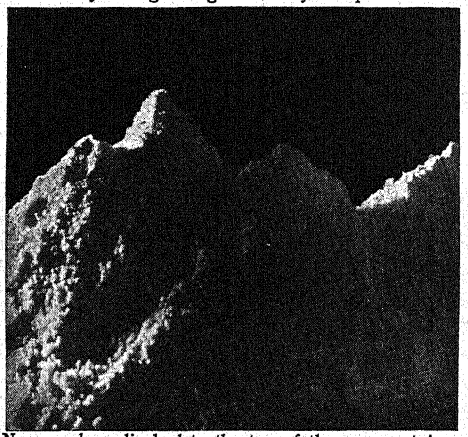
We see here the picture of an ordinary tennis-ball. By arranging the lighting of this object in a certain way, a clever photographer gets a remarkable result.



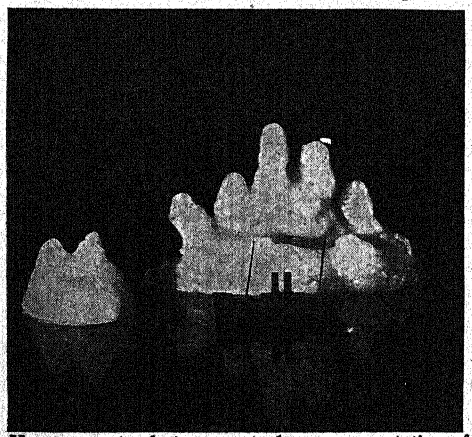
This is not a photograph of the moon, but of the tennis-ball in the first picture. This striking effect is obtained by letting the light fall only on top of the ball.



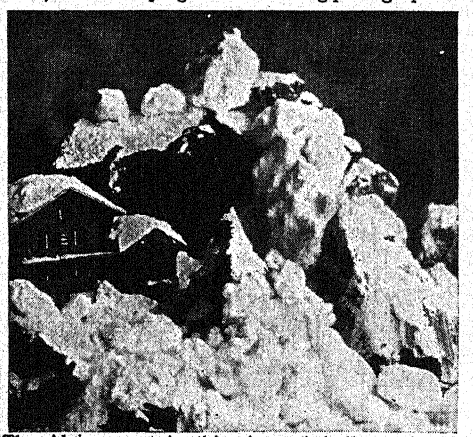
From ordinary table-salt we can build a fine range of mountains, as seen in this picture. When photographed, these will look exactly like a real range of snow-covered mountains, as shown in the next picture.



No man has climbed to the top of these mountains. If we attempted to set foot upon them we should crush them; they are made of salt piled on a dining-table, and cleverly lighted while being photographed.



Here we get what seems to be a representation of the huge icebergs that Shackleton met with on his Polar expedition. As a matter of fact, the picture shows candle-grease on glass with a paper boat.



The Alpine scene in this picture is built up of coal and alum upon a dining-room table. The little châlets, or cottages, are those tiny toy houses that we sometimes see displayed for sale in the shops.



PHOTOGRAPHY ON A TABLE

CONTINUED FROM 4620

WE have heard it said that the "camera cannot lie"; but nowadays this saying is hardly true. It may have been true years ago, when very little was known about photography, but it is really quite easy now to make cameras tell very big stories indeed. By carefully choosing and arranging a few quite ordinary articles, some very curious or beautiful pictures may be obtained, so that we can never feel quite sure that the photograph we are looking at is really what it seems to be. The pictures on page 4704 are none of them what they appear to be; they are made up, or faked, and a brief description of the way in which they were obtained will enable any boy who possesses a camera to arrange similar scenes for himself.

Table-top photography is very interesting, and provides plenty of employment and amusement during the winter, and on dull, wet days, as bright sunshine is not necessary to obtain good results. The idea is to obtain negatives of mimic landscapes which have been built up from anything that seems suitable. Very few preparations are necessary. The scenes must be arranged upon a steady platform, such as a table or an upturned box. The background is merely a good-sized piece of cardboard, propped up by means of a few heavy weights. Upon this background paper of different tints may be pinned, or we may attach masses of cotton-wool to imitate the sky and clouds.

It is just as well to have two screens, which may be set up on one side or on both sides of the stage for the purpose of shutting out the light—a strong top light often being better than any other. Any odd piece of stout card or thin board will serve the purpose. The camera should be set up opposite the stage, and should be furnished with a lens of fairly wide angle.

Very few people looking at the picture of what appears to be a new moon would imagine that they were only gazing at the photograph of part of a tennis-ball. Yet that is really all it is. In order to photograph the real moon very costly apparatus would be necessary, and only men who have had a great deal of experience in photography would be able to do it; but a very good imitation may be obtained at little or no cost.

The photograph should be taken at night, as the room must be quite dark. We must use a black cloth for a background, draping one end of it over a small box, and place a white tennis-ball on the top of this, as we see in the first picture on page 4704. We ask someone to hold a light close to the ball while we are focusing, to enable us to get the rim of the "moon" quite "sharp." When all is ready we blow out the light, take the cap off the lens, and burn a strip of magnesium wire, holding it in such a way that the full light falls upon one side of the tennis-ball. The resulting picture will be very puzzling to those who are not in the secret.

A photograph of real lightning, too, would be difficult to obtain, but we may get a very good imitation of this by means of a sheet of smoked glass. We smoke the glass by passing it rapidly over the flame of an oil-lamp, taking care not to hold the glass too near the flame, or it will crack. Then we mark the track of the lightning upon the smoked surface with the point of a sharp pencil, copying, if we like, a genuine photograph of sheet or forked lightning. We prop up the sheet of glass with the help of some boxes so that a light held behind it will shine through the scratches. A lighted candle must be placed behind the glass in order to focus, and when our preparations are complete we make the exposure by burning a strip of magnesium wire, or a little magnesium powder, in the place where the candle stood. If we stand the glass upon a piece of looking-glass, a good reflection, as though in the waters of a sea or lake, may be obtained.

To make a scene like the second picture in the centre of page 4704, we drape a grey

cloth to make a "cloudy" background and pile up a quantity of powdered salt or alum or sugar to form peaks and ridges, as in the first picture in the centre of page 4704. We focus so as to take in only the summits, and make the exposure as before by burning magnesium wire, taking care that the strong light falls well from one side. The result will be a very pretty picture of sunrise on the mountains.

The dangerous-looking icebergs in the first picture at the bottom of page 4704 are really nothing more than harmless little pieces of candle-wax. We soften the wax by gently warming it, press it into shape, and stand it upon a sheet of looking-glass. A little ship, cut out in dead-black paper and placed so that it rides above the reflection of the bergs, will add greatly to the general effect.

It is surprising how many things may be made to do duty in table-top photography. Carefully selected pieces of coal may be piled up to form mountains. Powdered salt, or alum, makes very good imitation snow. A moss-covered twig is an excellent tree. Little china figures or small dolls will take the place of people. Water may be imitated by a looking-glass, or, better still, by a black cloth covered with a sheet of ordinary glass, for a less brilliant and more natural reflection is obtained in this manner.

Little figures cut out of black paper may be used in all sorts of ways. Models, too, are very handy. In the last picture the house is a little model châlet from Switzerland, set up on a coal "mountain," well sprinkled with alum "snow." An almost endless variety of pictures may be obtained by pressing toy trains, carts, or dolls' houses into service, and, working on these lines, an ingenious boy will soon have a number of interesting pictures which will well repay him for the pains he has taken in obtaining them.

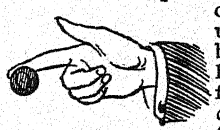
THE SUSPENDED PENNY

THIS trick, to be effective, should be performed with a coin borrowed from the company, which therefore cannot be suspected of being prepared in any way. The penny really used is one into the face of which the sharp end of a needle has been brazed, in such a manner that it shall form a tiny hook, less than an inch long, pointing towards the centre of the coin, as in our first picture. A watchmaker or silversmith will prepare a penny for you in this way at a cost of a few cents.



1. The penny prepared.

This coin the performer substitutes for the borrowed one, quietly laying this last behind some object on his table, where it will be readily available at the close of the trick. Showing the prepared coin in its place, he proceeds to "magnetize" it, by breathing on it and making mysterious "passes" over it. After doing this for a minute or so he explains that the penny is now under magnetic influence, and by virtue of such influence will remain suspended wherever he chooses to place it. This it does accordingly, attaching itself with equal facility to the cloth of his vest, the tip of his ear, the back of his hand, the tip of his forefinger, as seen in picture 2, or even the tip of his nose, as shown in picture 3.



2. Suspended from the forefinger.



3. Suspended from the nose.

This is done by means of the little needle-point before mentioned. Though the point does not penetrate to any perceptible extent the surfaces against which it is laid, it does so just enough to support the weight of the coin. Strange to say, no pain or inconvenience is caused, even to the most delicate skin, by the coin being suspended from it.

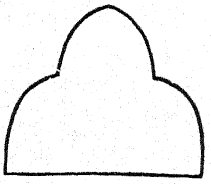
This is because the needle-point barely punctures the skin, and therefore it cannot possibly hurt, as we can easily prove for ourselves by taking a needle and gently pricking the surface skin of our finger or hand. At the close of the trick, the prepared coin must again be secretly exchanged for the borrowed penny, which has been lying meanwhile on the table. The young wizard will find the following an easy and effective way of doing this. The performer has on his table a card, either one of a pack or some other card of about similar size. As a sort of final test, he remarks: "If the influence is strong enough, the penny will even hang on to a card." He picks up the card, and makes the attempt, or, rather, pretends to do so, but purposely fails. "No, the penny is getting tired; I must magnetize it a little more." He lays down the card upon the borrowed coin, and pretends to "magnetize" the prepared one as he did before. He then picks up the card again, but secretly brings up with it the borrowed coin, held against the back of it by the fingers, the thumb lying on the face of the card. Again he endeavors to make the prepared coin attach itself to the card, but again fails. "It is no use," he says; "the power is exhausted. I return your penny, with many thanks." So saying, he brings the card into a horizontal position, and lays the prepared coin upon it, with its edge just beneath the tip of the thumb.

The performer then moves towards the lender, carrying the coin on the card, but just before he reaches him slopes the card towards himself, and lets the coin slide off into his left hand, with which he returns it to the owner. In reality, however, it is not the prepared coin which he lets fall into the hand, but the borrowed coin from the back of the card, the thumb holding back the one while the fingers release the other. If this is neatly done, no one will suspect for a moment that the coin has been changed.

When practising, it is a good plan to stand before a looking-glass to note how the trick will appear to the company, for a trick which is clumsily performed will give very little pleasure or satisfaction to the audience.

A TABLE MADE FROM A CHEESE-BOX

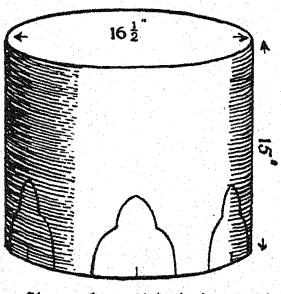
WITH a discarded cheese-box—the large kind of cheese-box that holds the biggest cheeses made—we can, with very little trouble, make a very convenient low table that will do well to stand in the hall or parlor, or that will do very nicely in the nursery, as it will be just the size for small children to use comfortably at their play. First, we get an empty cheese-box, which will be about fifteen inches deep and about sixteen inches across. Any box having about these dimensions will be satisfactory. We take off the lid, and mark the edge of the top where the lid was into eighteen equal spaces.



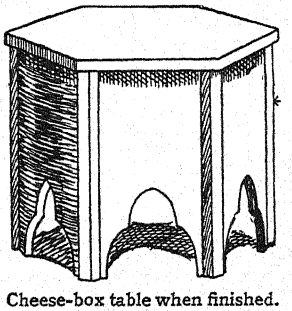
1. The paper design.

The best way to do this is to put a string right round it, and then measure the length of the string afterwards, dividing the length by eighteen, which will give us the length between each of the eighteen marks that we shall make. The length of the string in measuring the box we have described will be about fifty inches, and the distance between each of the eighteen marks will therefore be just about two and three-quarter inches.

Whatever the distance between the marks may be, we make a design which must measure double that distance, so that the design will probably be about five and a half inches across. Picture 1 shows such a design. We place it upon the side of the box close up to the edge, and between two of the marks we have already made. Then we make a pencil-line on the box right round by the edge of the design. Then we do this right round the box, six times in all, missing one clear space between each design, as indicated by the finished table in picture 3.



2. Cheese-box with designs cut.



3. Cheese-box table when finished.

Now, with our fret-saw, we cut out all the shapes we have made on the side of the box. This will give us six legs for our table, with ornamentation between the legs. Now we may strengthen the legs with advantage by having six strips, one inch broad and half an inch thick, which we put on outside, in the middle of each leg, screwing them on with three-quarter-inch round-headed screws from inside the box, and afterwards sawing off the ends square with the bottom of the legs and with the top of the table. Now we make a top for the table, putting on planed pieces of wood half an inch thick, and cutting them from corner to corner of the leg strips, thereby making a six-sided table-top. If the top piece is all in one piece, so much the better. If not, the pieces of which it is composed should be planed quite square on the edges and fastened together while they are being put on. They should be screwed on with three-quarter-inch screws from inside the box—that is, from the under side of the table. These screws will not be long enough to show through the table-top. Plenty of screws should be put in so that the top will not warp easily. After the edges have been sawn off, they should be planed and then sand-papered, after which the table may be stained, or varnished, or enameled any color desired, to make it look attractive.

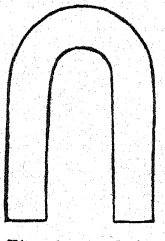
This table could also be used as a stand for a pot containing a fern or plant, and could be placed in a corner of a landing or hall.

THE PROBLEM OF THE HORSE-SHOE CARD

SOME boys and girls were sitting at a table, enjoying themselves on a wet afternoon by cutting out paper letters and figures with scissors. After a time they became tired of this game, and, to amuse them still further and keep them quiet, their uncle said he had a puzzle to give them, and would offer a prize to any of the children who could solve it correctly.

"What is it, uncle?" cried all the boys and girls. "We shall certainly solve the puzzle."

Then the uncle said he was going to cut out a piece of paper, and the puzzle was to give this paper just two cuts with the scissors, and by doing that to cut it into *seven* pieces. At once the boys and girls asked if they might fold the paper; but the gentleman said no folding was allowed—the paper must be kept flat, and two straight cuts given. The piece of paper he gave them was shaped something like a horse-shoe, as seen in the small picture here. It was three inches high and two inches across. The boys and girls puzzled themselves for a long time; and the uncle fulfilled his object of amusing them, but none of the children could do the task. At last they grew tired of trying, and asked their uncle to show them how it was done. Taking the card in one hand and the scissors in the other, he gave one cut; then, putting the pieces side by side, he gave another cut, and there were the seven pieces. How was the card cut? The solution will be found on page 4830.



The shape of the piece of paper.

A SIMPLE MUSEUM FOR BIRD LOVERS

THE cruel habit of shooting every rare or pretty bird that might be seen flying in the air, or perching on a tree, or resting on the water, is slowly passing away as our knowledge increases. It was at one time supposed to indicate a love of Nature if a person had a large number of stuffed birds under glass cases in his house—that is, if he himself had killed the birds or had encouraged someone else to kill them by paying money for such objects.

A COLLECTION OF FEATHERS

Now, however, many boys and girls are members of a national organization which pledges protection to birds. Most of us are wise enough to know that it is much better to let a rare or beautiful bird live to delight us and others by its song, or its graceful flight, than to kill it and have it stuffed badly, as is usually the case, and put under glass. If we want to study birds at close range, we can always go to a museum for the purpose, where, speaking generally, they are much better stuffed and mounted than in private collections.

But if we are lovers of birds and want to start a collection of some kind bearing upon our hobby, we can make a really valuable and instructive museum by collecting the feathers of birds. This must, of course, be done in a proper way. No mere jumble of all sorts and conditions of feathers is of any use, nor would it be at all interesting or beautiful. We must get the right kind of feathers, and must arrange them all in order.

WHEN FEATHERS ARE PLENTIFUL

The beauty of making a collection of feathers is that we do not have to kill the birds, and this in itself must be an immense satisfaction to every true lover of Nature. Feather-collecting is, of course, a hobby more especially for the country, and the best time to pursue the hobby is during the autumn and winter months.

In early autumn the birds are molting, and we may pick up in the fields and by the roadside many feathers that form excellent additions to our museums. Then, later in the autumn, many an unhappy bird comes to grief on his passage to the sunny South, and we may often find, lying about, the bodies of birds that have been killed by flying against telegraph wires. In such cases we get not merely isolated feathers, but whole wings. We may often find, too, the remains of smaller birds that have been pounced upon and killed by minks or hawks, and here again we can sometimes obtain complete wings in excellent condition.

Although feather-collecting can be best carried on in the country, it is not confined to the country. It is a hobby that we can practise in the suburbs of large towns, and many a pretty and useful feather for our collection may be found in the public parks. Most park-keepers will be quite willing to give us any feathers that are lying out of our reach, if we tell them why we want them. Birds begin molting just after the breeding season, and one or two pairs of wing-feathers are changed at a time, which allows all the wing-feathers to be changed during the season, ready for the migrating period, without affecting the balance of the bird in flight. For their weight, a bird's wing-feathers are among the strongest things in all Nature.

HOW TO KEEP FEATHERS

There are various ways of keeping the feathers. Small ones may be mounted between old negative glasses, which enables both sides to be examined very easily; but everyone has not a supply of the glass sheets available. Perhaps the cheapest method is to mount the feathers on sheets of stiff cartridge paper, keeping them in position with thin strips of gummed paper—ordinary stamp-edging will do very well. Or slits may be cut in the mounts, and the feathers slipped through.

The feathers should always be placed roughly in the position they occupied in the bird's wings, or on its body; and as we find fresh feathers, so we can gradually fill up the vacancies in our collection. A separate sheet of paper should be used for each bird. It is astonishing how pretty and effective a collection of feathers arranged thus, in scientific order, will appear. Each wing-feather has a name; and the correct names or numbers should be written against them, and the name of the bird in the top right or left-hand corner of the sheet. We can find the proper names of the different feathers by consulting any good bird book at the local public library.

WHAT THE FEATHERS TEACH US

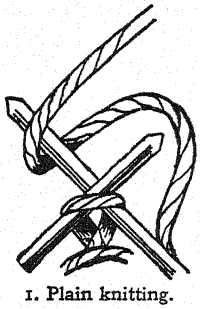
A good deal of valuable natural history is to be learned from a collection containing wings and wing-feathers. When the feathers are arranged in order, we can see the general shape of the wing, and from that shape we can learn a great deal about the habits of the bird.

We should expect birds of the weakest flight to have the simplest kind of wings, and this is the case. The wren, for instance, with its short, whirring flight, has a wing uniformly round in shape. The partridge, too, has a wing remarkably like the wren's in shape, and it also flies very much as the wren flies. Then, by a little use of our reason, we should expect birds of weak and short flight like these to live a good deal upon the ground, and that is the case; so that from the wings we can actually reason out the habits of the birds.

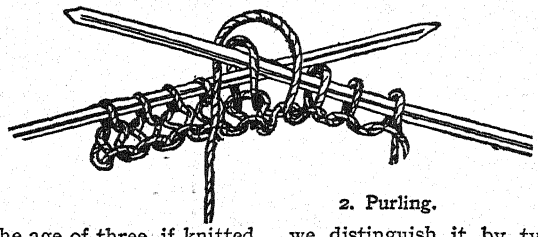
On the other hand, if a bird has a long, sharp wing, something like an arrow-head in shape, we should expect that it would be a swift flier, its wings cutting through the air like a knife-blade. And we should further reason out that birds of this kind are forced to fly rapidly in order to protect themselves, and must therefore be particularly the victims of birds of prey. This is perfectly true. The wings of teals and plovers are of the shape described, and their life is one long, sharp flight to escape from hawks and other birds of prey. These are only a few of the many interesting lessons that we may teach ourselves from a good collection of feathers.

HOW TO KNIT A CHILD'S SOCK

ANYONE who wishes to knit a sock should first practise plain knitting with the knitting needles. These are, at first, more trouble to handle than a crochet hook, until one gets accustomed to them; but after some practice the work can be rapidly done, so that many knitters hardly notice what their fingers are about, and can read while working. The stitches are formed on a long eyeless needle held in the left hand, regulated by the thumb and first finger, the other fingers steadying the needle. The right hand holds the second needle with the wool placed under the little finger, over the top of the third finger, under the middle one and over the first. In this way the supply of wool to the right needle is controlled. If we look at picture 4, on the next page, we shall see exactly how the needles should be held.



1. Plain knitting.



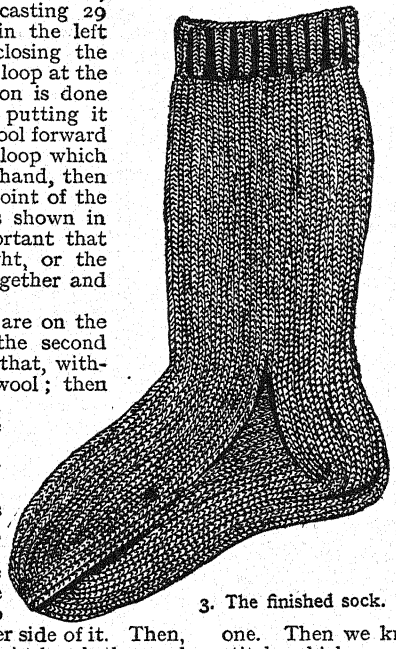
2. Purling.

A pair of socks for a child of about the age of three, if knitted in the way described here, would use up 2½ ounces of Andalusian wool or rather fine yarn. It can be knitted on four steel knitting needles, size 16.

We start with the leg of the sock, beginning at the top by casting 29 stitches on a needle held in the left hand, with the fingers enclosing the needle, after tying on to it a loop at the end of the wool. Casting on is done by taking another needle, putting it into the loop, bringing the wool forward and drawing it through the loop which is on the needle in the left hand, then placing this loop over the point of the needle in the left hand, as shown in picture 5. It is very important that the wool is not drawn tight, or the stitches will be too close together and difficult to knit.

When all the 29 stitches are on the first needle, we take up the second one and cast 24 stitches on that, without, of course, breaking the wool; then do the same with the third needle. We have now three needles forming a triangle, and holding altogether 77 stitches.

Knitting, or, to give it its correct name, plain knitting, is done in the following way: We insert the point of the right needle through the stitch on the left needle so that it comes out on the other side of it. Then, with the first finger of the right hand, the wool is looped over the point of the needle in the right hand, drawn through the stitch, and the left needle withdrawn. This sounds very complicated, but plain knitting is really easy when we hold the needles properly. We are really making a stitch on the right needle before withdrawing the left one. We must look very carefully at picture 1. After taking another stitch like the first one, we make quite a different one, called a "purl" stitch. Purling is done by bringing the wool in front of the right needle, putting this through the front part of the stitch on the left needle, then twisting the wool round the right needle, passing it through the loop, and lastly withdrawing the left needle. It is really knitting on the reverse side. Now look at picture 2. We take another purl stitch, and then repeat the two plain stitches and the two purl three times; next knit 2 plain stitches and 1 purl. This last purl stitch is going to make the seam stitch down the back of the sock, so we distinguish it by tying a little piece of white cotton on to it. We now continue knitting 2 plain and purling 2, or, as it is briefly put, knit 2 and purl 2, to the end of the needleful. Then we knit 2 and purl 2 till the stitches on the second and third needles are off.



3. The finished sock.

If we look at the sock in picture 3 on this page, we see that the upper part of the leg is different from the rest. It is what we call ribbed, or welted, to prevent the sock slipping down the leg. The furrows beside a rib are caused by the purl stitches.

We want 23 more rounds like the first one, and when these are done we knit 16 plain ones, but always purling the seam stitch when we come to it.

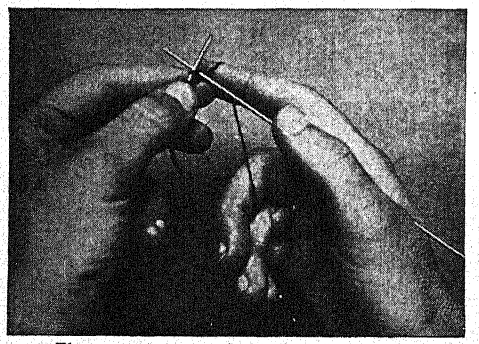
By this time we must think of *decreasing* our stitches, because the leg gets smaller towards the ankle. So in the next round we knit plain until we reach the third stitch before the seam stitch, and then knit 2 together. To do this we put the needle through 2 stitches and knit them as though they were one. Then we knit 1 and arrive at the seam stitch, which we purl. After that we decrease in another way by knitting 1, "slipping" 1—done by lifting the stitch on to the right needle—knitting 1, and with the left needle

drawing the slipped stitch over the one just knitted. The round is finished plain. The next five rounds are plain, and the sixth is like the one described above, which decreases.

These six rounds are repeated four times, and by then we have only 17 stitches on the first needle, the odd one in the middle being the seam stitch, while there are still 24 on each of the other two needles.

The leg of the sock is finished with 20 more plain rounds.

It is now time to start the heel of the sock. This we do by knitting 8, purling the seam stitch, knitting 8, and then knitting 8 on the second needle. We now turn the work and go back again, slipping the first stitch and purling 15 till we are back at the seam stitch again. This we knit plain; then purl the next 16. There are now 33 stitches on one needle; they are called heel stitches, and, leaving the other 32 to form the instep later, we turn our attention to these heel stitches, knitting 1 row and purling 1 row till we have



4. The correct way to hold the knitting needles.

28 rows, and taking care to slip the first stitch, but retain the seam stitch.

Now for the heel we slip the first stitch, knit 6, make 1—that is, make two stitches on the same stitch, one on the front and one on the back of it—knit 2 stitches together, knit 4, again knit 2 together, and then knit 1.

We are now at the seam stitch, and, after purling it, we continue to knit 1, slip 1, knit 1, draw the slipped stitch over, knit 4, slip 1, knit 1, and draw the slipped stitch over. It is now necessary to turn again, so we make 1, and purl to the ninth stitch after the seam stitch. The next time of turning we proceed as above from "make 1" and continue till all these side stitches are knitted, but in the last turn omit the first stitch before purling.

We should now have 15 stitches for the top of the heel. We knit 15 plain from them, and take up and knit on the same needle 15 stitches that are on the side of this piece.

Next we can return to the 32 instep stitches and knit them plain on to one needle. The 15 stitches on the other side of the heel are also taken up, and 7 stitches knitted on to the top of the heel.

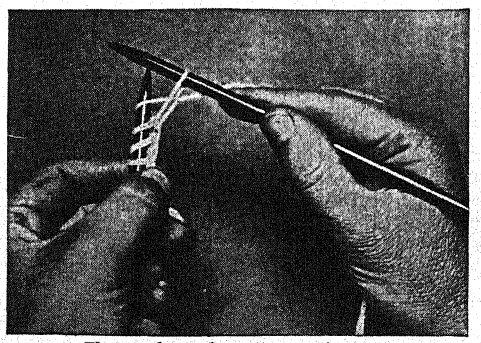
If we count our stitches correctly, we shall now find that we have 77, the number with which we started on the three needles.

To make the gussets at the sides, we start with the first of the two foot needles by knitting 1, slipping 1, knitting 1, and drawing the slipped stitch over. That is to decrease; then we knit plain to the third stitch from the end of the second foot needle, and dispose of these by knitting 2 together and knitting 1. There is still the instep needle, which we knit plain, and follow that by knitting 2 rounds.

This knitting for the gussets we repeat till the round consists of 65 stitches, 33 stitches on two of the needles, and 32 instep ones on the third. After knitting 30 rounds we give our attention to the toe of the sock.

The toe is naturally obtained by decreasing. We knit 3, slip 1, knit 1, draw the slipped stitch over, knit till we reach the fifth stitch from the end of the second foot needle, and finish by knitting 2 together, and then knitting 3.

There is now the instep needle. This we dispose of by knitting 3, slipping 1, knitting 1, drawing the slipped stitch over, and at



5. The method of casting on the stitches.

the fifth stitch from the end knitting 2 together and then knitting 3. Two plain rounds follow.

These toe rounds are repeated three times, but then a decrease round alternates with a plain round until only 25 toe stitches remain. The 13 foot stitches are now transferred to one needle, which is placed alongside the instep needle, and 2 stitches knitted through together; but as there is an odd central stitch on one needle we dispose of that by knitting 3 together. We make the last loop large enough to pass the ball of wool through it, draw the wool tight and cut it about 1 inch from the sock. That finishes the sock, which should now look like that shown in picture 3 on the previous page.

Hand-made socks and stockings not only are warmer than the machine-made ones, but they wear better and last much longer, so that they are always in demand. Those of us who are beginning to think of Christmas presents will find that a pair of stockings is a very acceptable gift to either the golfer or the cyclist. As far as the actual number of stitches is concerned, of course, the instructions given above will be useless; but, having once grasped the idea, we shall find that we have no difficulty in carrying out any pattern which we may fancy to copy.

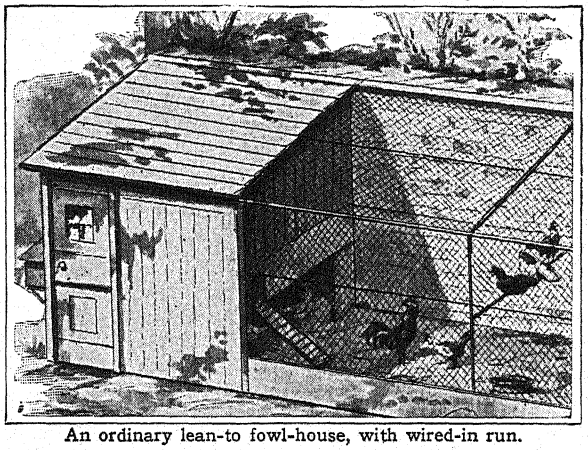
POULTRY-KEEPING AS A HOBBY

POULTRY-KEEPING as a hobby is comparatively inexpensive, and the new-laid eggs we shall get from time to time will be some recompense for the trouble the fowls entail.

If we decide to keep fowls, and think that we are going to make money thereby, we may find ourselves very much mistaken after a few months of experience. When we begin to reckon up the cost of the fowls and the fowl-house, with all the little things needed for it, and add up what we have spent upon grain, we may find that the eggs have cost us more than those which we should have purchased at a shop, and that there is nothing for all the time and trouble expended upon the birds.

It may pay to keep fowls if there is plenty of food for them that would otherwise be thrown away, or if there is a yard where they can pick up all they want; but if the greater part of the food has to be purchased, we shall probably find that they are an expense. Therefore, it is not wise for us to imagine that we shall make a large profit from them.

The kind of hens that we should purchase will depend upon two things—whether we wish to have pretty birds, or as many eggs as possible. Let us assume that we desire eggs, in which case we should choose those which are called non-sitting hens, such as Minorcas and Leghorns. These fowls lay well and give good-sized, white-shelled eggs. Also, they thrive much better, as a rule, than many other breeds when they are kept in rather confined quarters.



An ordinary lean-to fowl-house, with wired-in run.

We will now consider the fowl-house and run. This should, if possible, be a wooden building of what is called the lean-to kind—that is to say, it should be as seen in picture 1. The bigger it is the better. It should be not narrower than four feet, and as long as possible. It should be covered on top and at both ends, and, if possible, it should be put up facing the sun. The health of the birds demands that we should give them a proper kind of floor, because if they have a soft earth floor, they are sure to turn sick and pine when the wet weather comes. We should first get plenty of big stones, broken brick, and other dry rubbish, and spread it over the floor until it is about six inches deep. Then we should spread on top of that some gravel, sand, and ashes, to the depth of a further three inches.

At one end a space should be shut in so as to make a sleeping, or roosting, chamber; and into this we should put perches and nest-boxes, taking care not to unduly crowd the birds. The roosting chamber should be well ventilated. Also, it should have a door communicating with the run, or open-air part, this door being closed at night so as to make the birds cosy and comfortable.

The front of the run should be covered with galvanized wire netting, as seen in the picture; and there should be a door from the outside into the run, as well as a door from the outside into the roosting chamber.

If the hens are allowed out, they may possibly fly away, and the best way to prevent this is to clip the feathers of one wing. We should cut only the web of the feathers and not the quill. This is not cruel, and it effectually disturbs their balance, and thus prevents them from flying. They will not, of course, be given access to flower-beds; but if there is provision by which they can have daily exercise without doing any damage, so much the better. If they are confined to the roosting chamber and the run all the time, it is necessary to give them green food, such as sliced turnips, cabbages, or chopped grass. All scraps from the kitchen should be thrown to the fowls. Such scraps, which may include pieces of meat, hard bread, and vegetables, should be soaked in water overnight, so that they are nice and soft in the morning, which is the best time to give soft food. Three meals a day are quite enough. At noon, vegetables, cooked or green, or cooked maize may be given, but the evening meal should be grain, such as wheat or oats, which ought to be supplied not in a dish, but scattered over the ground so that the birds have to pick it up by scratching for it. There should be some small stones and grit placed in a box in the run, as that helps the birds to digest their food. Flint grit can be purchased cheaply from most corn-chandlers.

Fowls need lime, as it is from the lime which they eat that the shells of their eggs are made. The best form in which to give the lime is crushed shells, especially oyster-shells pounded fine in a mortar.

Water is necessary, and must be supplied in a fountain. Regular drinking fountains are made of tin or zinc; but an excellent drinking fountain can be made by placing a bottle full of water upside down in a dish, as seen in picture 2. The lip of the bottle should be raised from the bottom of the dish about two inches, and as the water is consumed, or as it evaporates, the level is kept up until the supply in the bottle is exhausted.

The cost of the food for the hens need not be great. It depends upon how much kitchen refuse is available for their feed, and also upon whether the grain is bought in small quantities or in large quantities. The latter always works out more cheaply. But if a fair amount of kitchen stuff is available, and if the other food is bought in bulk, the cost should not be more than a nickel a week for each bird.



Drinking fountain for fowls.

We have supposed that our fowls were to be kept only to provide us with eggs, which is the chief reason why fowls are kept. But if we want to have our hens lay eggs and hatch them, then we had better have what are called sitting hens. The varieties of fowls that we have already mentioned are not good sitters. Some of the best sitting hens are the kinds known as Rhode Island Reds, Wyandottes, Brahmas, Orpingtons, and Plymouth Rocks. But we ought to understand at the outset that if we have only a little space for our fowls in a back yard, it is a mistake to breed chickens. Chickens are apt to sicken and die unless they have plenty of room, such as they get on a farm, and it is far better not to hatch chickens if our space is limited.

If, however, we place a sitting of eggs under a hen, the young chicks will be hatched in three weeks. The following day the old hen and her brood should be placed out in a coop, and the little chicks should be given baby chick food, which is finely ground. See that plenty of fresh water is always kept within reach of the chicks.

Cleanliness is absolutely necessary in order to keep the chickens in a healthy condition; and the houses, nests, and runs should be thoroughly cleansed at least once a week.

HUNTING THE FOX AND THE GEESE

THERE is an interesting and exciting game that can be played with checkers on a checker-board, which is usually called Fox and Geese, but is much better named Fox and Hounds. It is a game of skill for two players; and five checkers are used in the game, one black, called the fox, and four white, called the geese, or hounds.

To begin the game, the players choose sides, one being the fox, and he takes the black checker; while the other, who plays hounds, takes the four white checkers. The hounds are arranged on the four black squares at one side of the board, while the fox is placed on any one of the four black squares at the opposite side of the board.

The game is for one player to make his hounds hem in the fox, while the aim of the fox is to escape through the line of hounds to the far side of the board, which means a win for the fox. The moves are made as in an ordinary game of checkers—that is, diagonally, one square at a time; but while the hounds may move only in one direction—forward—the fox is allowed to move either backward or forward, like the kings in ordinary checkers.

Given two equaly skilful players, who know all the moves, the hounds are sure to hem in the fox, but unless the players are thoroughly well up in the game, there is an exciting contest, in which sometimes the fox, and sometimes the hounds, will win. Of course, no pieces are taken in the game, and the hounds always have the first move.

When we play as the hounds, the great idea is for us to keep our pieces in a line and gradually move them forward in this way; whereas, if we are the fox, we should move our piece about in such a way as to confuse our opponent and make him get his men out of a straight line. The slightest slip in the moves of the hounds will let the fox through.

THE GAME OF SNAP

THIS is rather a noisy card game, but it causes great fun. Interest never flags, and the players must be alert all the time. The cards used may be of a special kind in sets of four, each of the cards in each set being alike. Thus we may get four roses or four dahlias in a set; animals may take the place of flowers. But if we do not have such pictorial cards, an ordinary pack of playing cards will do instead. In such a pack there are four kings, four queens, four aces, and so on.

Now let us begin to play. The more players the merrier the party. The cards are dealt face downwards, and no player looks at his cards. When the cards have been dealt, the player sitting on the left-hand side of the dealer begins by turning over the top card of his heap, and placing it face upwards on the table some distance in front of him, and away from his heap. The next player on the first player's left does the same thing with the top card of his pile, and so on round the table, one player after another turning his top card face upwards. While this turning up is going on, if any player notices that a card turned up is the same kind of a card—such as a rose card, a donkey card, or a king card—as the uppermost exposed card in front of himself he calls out "Snap." Whichever of the two players with similar cards calls out the word "Snap" first takes all the turned-up cards in front of the other player, and puts them beneath his unturned heap. Then the game goes on again.

Unless a player is very sharp he will lose heap after heap until all his cards have been taken, when he will be out of the game.

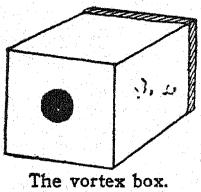
If a player calls "Snap" by mistake, the other player whose card prompted him to call takes all the caller's exposed cards. This prevents players from calling out "Snap" to every card that is turned over, in the hope that it may be like theirs.

As the game proceeds, one after another of the players loses all his cards, until finally there are only two players left in the game. These two players go on until one of them succeeds in winning all the cards of the other player, when the game is at an end.

A BOX THAT MAKES SMOKE RINGS

WE have all seen those rings of smoke which some smokers can throw out of their mouths, and which have, perhaps, made us wonder. The science of the smoke rings is fully described elsewhere in this book, and while we do not want to blow smoke rings from our mouths, it will be very interesting and instructive if we can make an apparatus that will blow out the rings for us.

Such a toy is of scientific value, and can be made quite easily by any boy or girl. It is called a vortex box, the word *vortex* meaning whirlpool or whirlwind.



The vortex box.

We must first of all take a square wooden box, such as those cases in which we buy four or five pounds of tea. Then we remove the lid altogether, and at the side opposite to the opening thus formed we mark a round circle, about three inches in diameter, and, first boring a hole with a tool or a red-hot poker, we insert a small saw and saw the three-inch hole.

Now take a piece of stout canvas, a little larger than the place where the lid used to be, and nail it over the opening in place of the lid. Then glue down all round the flap that is left by the canvas being too large for the square opening. All that we now have to do to get our rings of smoke is to fill the box with smoke and tap smartly on the stretched canvas, when the rings will follow one another in rapid succession.

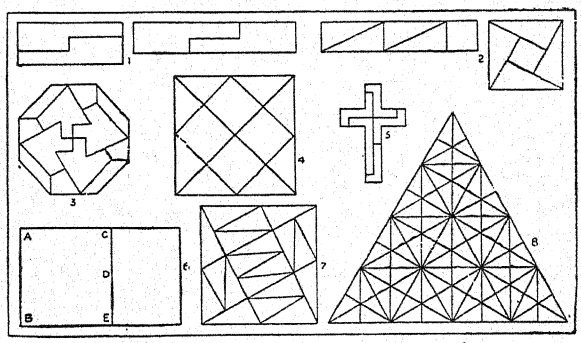
There is a way of getting a very white smoke by having openings in the side of the box, and placing through these glass tubes connected with flasks containing chemicals. The chemicals are heated, gases enter the box from the flasks, and as they combine there a white smoke is formed. But we had better not attempt such a difficult process, as it is quite simple to fill the box with smoke. We can burn coarse brown paper in the box, and as it smolders a thick smoke will be formed that will serve our purpose quite well.

After making a vortex box, we certainly ought to turn to page 3426 and learn the reasons for the rings being formed. The box can be made more amusing by painting a man's face on the side where the round hole is, letting the hole represent the mouth.

SOLUTIONS TO THE PUZZLES WITH PAPER

ON page 4615 are given a number of interesting puzzles that can be worked out with scissors and paper. These are the correct solutions to the puzzles. The carpenter who had a plank 4 feet by 1½ feet, and had to fill a hole 6 feet by 1 foot, cutting the wood into only two pieces, did it in the manner shown in picture 1.

Similarly, the carpenter who had to put a floor into a cupboard which was exactly square, using a plank of wood 15 feet by 3 feet, and cutting this into only five pieces, four of which should be equal, did it as shown in picture 2



1 & 2. The carpenter's puzzles. 3. The octagon. 4. A square made of squares and triangles. 5. The puzzle cross. 6. The folded paper. 7. Square made of 20 triangles. 8. Triangle made of 653 triangles.

The third puzzle was to cut out four of each of three shapes and fit these together into an octagon. This is done as shown in picture 3. The eight equal squares, four of which are cut into eight triangles, if placed together as shown in picture 4, will form the new square that was required.

In the fifth puzzle there were five pieces of paper, three of which were of the same size and shape, and these had to be put together to form a cross. This is done in the manner shown in picture 5.

The sixth puzzle was very ingenious. The somewhat elaborate cross with stand and candles that was given on the same page had to be built up by folding a single piece of paper in a certain way and making not more than one cut with a pair of scissors. Four folds have to be made before the cutting is done. Suppose picture 6 to be the piece of paper. First of all, mark off the square A, B, E, C. Now fold the corner A over to E; now fold B over to C, then C to E, and, finally, from D to E. The paper thus folded must be cut lengthways along the centre, and when opened out it will be found to consist of nine pieces of paper, which can quickly be put together to form the cross and candles. In the seventh puzzle a square can be built up from twenty triangles in the manner shown in picture 7. The last puzzle was in some ways the one that gave the greatest scope for cleverness on the part of those trying to solve it. If the twenty-nine lines be drawn as shown in picture 8, it will be seen at once that a very large number of triangles, large and small and of varied shapes, are formed. But not many people would credit the very large number indeed that are thus made. Altogether there are in this large triangle six hundred and fifty-three smaller triangles.

THE NEXT THINGS TO MAKE AND THINGS TO DO BEGIN ON PAGE 4819.

LITTLE PICTURE-STORIES IN FRENCH

First line: French. Second line: English words. Third line: As we say it in English.

Un jour quelque chose s'abattit sur la fenêtre de la salle d'étude.
One day something itself fell upon the window of the room of study.
One day something flew in at the school-room window.

Les enfants sautèrent. " Regarde ! " s'écria Ethel. " C'est une petite grive."
The children jumped. " Look ! " herself cried Ethel. " This is a little thrush."
The children jumped up. " Look ! " cried Ethel. " It is a little thrush."

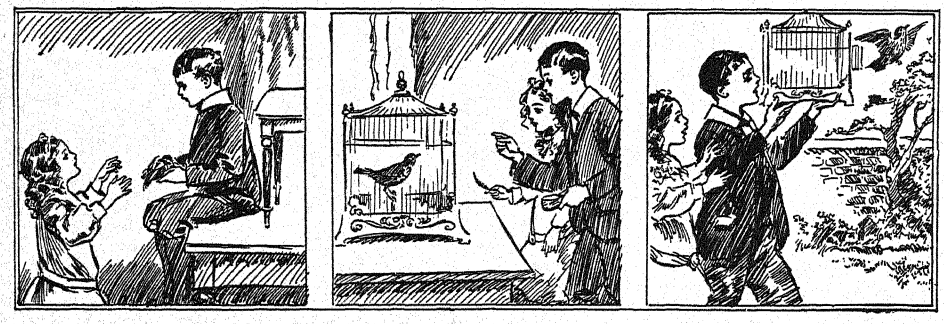
" Essayons de l'attraper," dit Guillaume. L'oiseau était sur les rideaux.
" Let us try of her to catch," said William. The bird was upon the curtains.
" Let us try to catch it," said William. The bird was on the curtains.



Il essaya de l'atteindre, mais il était trop petit. Il considéra un moment.
He tried of it to reach, but he was too little. He considered a moment.
He tried to reach it, but he was too short. He thought a moment.

Guillaume mit une chaise sur la table, monta dessus, et étendit la main.
William put a chair upon the table, mounted upon, and extended the hand.
William put a chair on the table, climbed up, and put out his hand.

L'oiseau ne bougea pas. " Pauvre petite grive ! " dit-il. " L'aile est blessée."
The bird not stirred not. " Poor little thrush ! " said he. " The wing is hurt."
The bird did not move. " Poor little thrush ! " said he. " Its wing is hurt."



" Laisse-moi la voir," dit Ethel, courant à la table et étendant la main.
" Leave me it to see," said Ethel, running up to the table and extending the hand.
" Let me see it," said Ethel, running up to the table and holding out her hand.

" Nous la mettrons dans une cage et nous la soignerons." " Quelle bonne idée ! "
" We it will put into a cage and him will care for." " What good idea ! "
" We will put it in a cage and take care of it." " What a good idea ! "

Aussitôt quel e petit oiseau était tout à fait bien, il désirait encore la liberté.
As soon as the little bird was all to make well, it desired again the liberty.
As soon as the little bird was quite well, he wanted to be set free again.

Les enfants ouvrirent la porte de la cage et l'heureuse grive s'envola.
The children opened the door of the cage and the happy thrush herself flew away.
The children opened the cage door and the happy thrush flew away.

A GREAT POEM ABOUT A GREAT MAN

LORD TENNYSON had only recently been appointed Poet Laureate when the Duke of Wellington died, in 1852. It thus happened that his first duty as the "official" poet was to write an ode on the death of the renowned soldier and statesman. Poems written in such circumstances have seldom been truly inspired; but this is an exception to the rule, as it is a worthy example of Tennyson's poetry. It has the true heroic ring; it is genuinely eloquent; it moves to the stately, solemn march of a great event. It also contains several lines which have passed into popular quotation, notably, "The path of duty was the way to glory." Yet almost every writer in the Press of that time denounced the poem as unworthy of the occasion. This shows that what contemporary critics say about the literature of their own time is sometimes unjust; all critics now regard the "Ode on the Death of the Duke of Wellington" in the light in which we have spoken of it.

ODE ON THE DEATH OF WELLINGTON

CONTINUED FROM 4651

I.

BURY the Great Duke
With an empire's lamentation,
Let us bury the Great Duke
To the noise of the mourning of a mighty nation,
Mourning when their leaders fall,
Warriors carry the warrior's pall,
And sorrow darkens hamlet and hall.

II.

Where shall we lay the man whom we deplore?
Here, in streaming London's central roar.
Let the sound of those he wrought for,
And the feet of those he fought for,
Echo round his bones for evermore.

III.

Lead out the pageant: sad and slow,
As fits an universal woe,
Let the long, long procession go,
And let the sorrowing crowd about it grow,
And let the mournful martial music blow;
The last great Englishman is low.

IV.

Mourn, for to us he seems the last,
Remembering all his greatness in the past.
No more in soldier fashion will he greet
With lifted hand the gazer in the street.
O friends, our chief state-oracle is mute:
Mourn for the man of long-enduring blood,
The statesman-warrior, moderate, resolute,
Whole in himself, a common good.
Mourn for the man of amplest influence,
Yet clearest of ambitious crime,
Our greatest yet with least pretence,
Great in council and great in war,
Foremost captain of his time,
Rich in saving common-sense,
And, as the greatest only are,
In his simplicity sublime.
O good grey head which all men knew,
O voice from which their omens all men drew,
O iron nerve to true occasion true,
O fall'n at length that tower of strength
Which stood four-square to all the winds that blew!
Such was he whom we deplore.
The long self-sacrifice of life is o'er.
The great World-victor's victor will be seen no more.

V.

All is over and done:
Render thanks to the Giver,
England, for thy son.
Let the bell be toll'd.
Render thanks to the Giver,
And render him to the mold
Under the cross of gold
That shines over city and river,
There he shall rest for ever
Among the wise and the bold.
Let the bell be toll'd:
And a reverent people behold
The towering car, the sable steeds:
Bright let it be with his blazon'd deeds,
Dark in its funeral fold.
Let the bell be toll'd:
And a deeper knell in the heart be knoll'd;
And the sound of the sorrowing anthem roll'd
Through the dome of the golden cross;
And the volleying cannon thunder his loss;
He knew their voices of old.
For many a time in many a clime
His captain's ear has heard them boom,
Bellowing victory, bellowing doom:
When he with those deep voices wrought,
Guarding realms and kings from shame;
With those deep voices our dead captain taught
The tyrant, and asserts his claim
In that dread sound to the great name,
Which he has worn so pure of blame,
In praise and in dispraise the same,
A man of well-attemper'd frame.
O civic muse, to such a name,
To such a name for ages long,
To such a name,

Preserve a broad approach of fame,
And ever-echoing avenues of song.

VI.

Who is he that cometh, like an honour'd guest,
With banner and with music, with soldier and with priest,
With a nation weeping, and breaking on my rest?
Mighty Seaman, this is he
Was great by land as thou by sea.
Thine island loves thee well, thou famous man,
The greatest sailor since our world began.
Now, to the roll of muffled drums,
To thee the greatest soldier comes;
For this is he
Was great by land as thou by sea;
His foes were thine; he kept us free;
O give him welcome, this is he
Worthy of our gorgeous rites,
And worthy to be laid by thee;
For this is England's greatest son,
He that gain'd a hundred fights,
Nor ever lost an English gun;
This is he that far away
Against the myriads of Assaye
Clash'd with his fiery few and won;
And underneath another sun,
Warring on a later day,
Round affrighted Lisbon drew
The treble works, the vast designs
Of his labour'd rampart-lines,
Where he greatly stood at bay,
Whence he issued forth anew,
And ever great and greater grew,
Beating from the wasted vines
Back to France her banded swarms,
Back to France with countless blows,
Till o'er the hills her eagles flew
Past the Pyrenean pines,
Follow'd up in valley and glen
With blare of bugle, clamour of men,
Roll of cannon and clash of arms,
And England pouring on her foes.
Such a war had such a close.
Again their ravening eagle rose
In anger, wheel'd on Europe-shadowing wings,
And barking for the thrones of kings;
Till one that sought but Duty's iron crown
On that loud Sabbath shook the spoiler down;
A day of onsets of despair!
Dash'd on every rocky square
Their surging charges foam'd themselves away;
Last, the Prussian trumpet blew;
Through the long-tormented air
Heaven flash'd a sudden jubilant ray,
And down we swept and charged and overthrew.
So great a soldier taught us there,
What long-enduring hearts could do
In that world-earthquake, Waterloo!
Mighty Seaman, tender and true,
And pure as he from taint of craven guile,
O saviour of the silver-coasted isle,
O shaker of the Baltic and the Nile,
If aught of things that here befall
Touch a spirit among things divine,
If love of country move thee there at all,
Be glad, because his bones are laid by thine!
And through the centuries let a people's voice
In full acclaim,
A people's voice,
The proof and echo of all human fame,
A people's voice, when they rejoice
At civic revel and pomp and game,
Attest their great commander's claim
With honour, honour, honour, honour to him,
Eternal honour to his name.

VII.

A people's voice! we are a people yet.
Though all men else their nobler dreams forget,
Confused by brainless mobs and lawless powers;
Thank Him who isled us here, and roughly set
His Saxon in blown seas and storming showers,
We have a voice, with which to pay the debt
Of boundless love and reverence and regret
To those great men who fought, and kept it ours.
And keep it ours, O God, from brute control;
O statesmen, guard us, guard the eye, the soul
Of Europe, keep our noble England whole,
And save the one true seed of freedom sown
Betwixt a people and their ancient throne,
That sober freedom out of which there springs
Our loyal passion for our temperate kings;
For, saving that, ye help to save mankind
Till public wrong be crumbled into dust,
And drill the raw world for the march of mind,
Till crowds at length be sane and crowns be just.
But wink no more in slothful overtrust.
Remember him who led your hosts;
He bade you guard the sacred coasts.
Your cannons moulder on the seaward wall;
His voice is silent in your council-hall
For ever; and whatever tempests lower
For ever silent; even if they broke
In thunder, silent; yet remember all
He spoke among you, and the Man who spoke,
Who never sold the truth to serve the hour,
Nor palter'd with eternal God for power;
Who let the turbid streams of rumour flow
Through either babbling world of high and low;
Whose life was work, whose language rife
With rugged maxims hewn from life;
Who never spoke against a foe;
Whose eighty winters freeze with one rebuke
All great self-seekers trampling on the right:
Truth-teller was our England's Alfred named;
Truth-lover was our English Duke;
Whatever record leap to light
He never shall be shamed.

VIII.

Lo, the leader in these glorious wars
Now to glorious burial slowly borne,
Follow'd by the brave of other lands,
He, on whom from both her open hands
Lavish Honour shower'd all her stars,
And affluent Fortune emptied all her horn.
Yea, let all good things await
Him who cares not to be great,
But as he saves or serves the State.
Not once or twice in our rough island-story,

The path of duty was the way to glory:
He that walks it, only thirsting
For the right, and learns to deaden
Love of self, before his journey closes,
He shall find the stubborn thistle bursting
Into glossy purples, which outredden
All voluptuous garden roses.
Not once or twice in our fair island-story,
The path of duty was the way to glory:
He, that ever following her commands,
On with toil of heart and knees and hands,
Through the long gorge to the far light has won
His path upward, and prevail'd,
Shall find the toppling crags of Duty scaled
Are close upon the shining table-lands
To which our God Himself is moon and sun.
Such was he: his work is done.
But while the races of mankind endure,
Let his great example stand
Colossal, seen of every land,
And keep the soldier firm, the statesman pure;
Till in all lands and through all human story
The path of duty be the way to glory:
And let the land whose hearths he saved from shame
For many and many an age proclaim
At civic revel and pomp and game,
And when the long-illumined cities flame,
Their ever-loyal iron leader's fame,
With honour, honour, honour, honour to him,
Eternal honour to his name.

IX.

Peace, his triumph will be sung
By some yet unmoulded tongue
Far on in summers that we shall not see:
Peace, it is a day of pain
For one about whose patriarchal knee
Late the little children clung:
O peace, it is a day of pain
For one, upon whose hand and heart and brain
Once the weight and fate of Europe hung.
Ours the pain, be his the gain!
More than is of man's degree
Must be with us, watching here
At this, our great solemnity.
Whom we see not we revere;
We revere, and we refrain
From talk of battles loud and vain,
And brawling memories all too free
For such a wise humility
As befits a solemn fane:
We revere, and while we hear
The tides of Music's golden sea
Setting toward eternity,
Uplifted high in heart and hope are we,
Until we doubt not that for one so true
There must be other nobler work to do,
Than when he fought at Waterloo,
And Victor he must ever be.
For though the Giant Ages heave the hill
And break the shore, and evermore
Make and break, and work their will;
Tho' world on world in myriad myriads roll
Round us, each with different powers,
And other forms of life than ours,
What know we greater than the soul?
On God and godlike men we build our trust.
Hush, the Dead March wails in the people's ears:
The dark crowd moves, and there are sobs and tears:
The black earth yawns: the mortal disappears;
Ashes to ashes, dust to dust;
He is gone who seem'd so great.
Gone; but nothing can bereave him
Of the force he made his own
Being here, and we believe him
Something far advanced in State,
And that he wears a truer crown
Than any wreath that man can weave him.
Speak no more of his renown,
Lay your earthly fancies down,
And in the vast cathedral leave him.
God accept him, Christ receive him.

SOLITUDE

In these lines by Lord Byron we see an unrestful spirit contemplating the mighty forces of Nature, for although the title is "Solitude," it is not of solitude he sings so much as of man warring against waves and wind, in which unequal contest man, for the moment, has no thought of his fellows, but only of himself. It is not a poem of despair, for nothing gives more zest to life than man's battle with Nature.

THERE is a pleasure in the pathless woods,
There is a rapture on the lonely shore,
There is society where none intrudes,
By the deep sea, and music in its roar.
I love not man the less, but Nature more,
From these our interviews, in which I steal
From all I may be, or have been before,
To mingle with the universe, and feel
What I can ne'er express, yet cannot all conceal.

Roll on, thou deep and dark blue ocean—roll!
Ten thousand fleets sweep over thee in vain;
Man marks the earth with ruin—his control
Stops with the shore; upon the watery plain
The wrecks are all thy deed, nor doth remain
A shadow of man's ravage, save his own,
When, for a moment, like a drop of rain,
He sinks into thy depths with bubbling groan,
Without a grave, unknell'd, uncoffin'd, and unknown.

ENGLAND AND AMERICA IN 1782

Lord Tennyson in this short poem strikes the true note and gives the proper view of our great American Revolution, when the British colonies in North America fought with the Motherland for their independence. His little poem gives us a better conception of that great event than many a long and bitter history of that terrible strife has done. It is a manly and noble view of a great event in the world's history, which was inevitable for the progress of mankind.

O THOU that sendest out the man
To rule by land and sea,
Strong mother of the Lion-line,
Be proud of those strong sons of thine
Who wrench'd their rights from thee!

What wonder if in noble heat
Those men thine arms withstood,
Retaught the lesson thou hadst taught,
And in thy spirit with thee fought—
Who sprang from English blood!

But thou rejoice with liberal joy,
Lift up thy rocky face,
And shatter, when the storms are black,
In many a streaming torrent back,
The seas that rock thy base!

Whatever harmonies of law
The growing world assume,
Thy work is thine—the single note
From that deep chord which Hampden smote
Will vibrate to the doom.

ULYSSES

One of the most interesting of all the legends of ancient Greece is that which tells of the wanderings of Ulysses. It is briefly given in the STORY OF FAMOUS BOOKS, on page 74, and it might be well to read that together with this fine poem by Lord Tennyson. The poet is not here concerned with the adventures of Ulysses, or, indeed, with the hero of old Greece, except as a means to express the restless spirit. For his song is really in praise of the man who cannot sit idle by his cosy hearth, but must roam abroad on new quests, and even in old age retains the keen scent of youth for adventure and fresh experience, being prepared equally for great pleasures and for suffering. It is only those who have suffered most that have most enjoyed.

IT little profits that an idle king,
By this still hearth, among these barren crags,
Match'd with an aged wife, I mete and dole
Unequal laws unto a savage race,
That hoard, and sleep, and feed, and know not me.
I cannot rest from travel; I will drink
Life to the lees: all times I have enjoy'd
Greatly, have suffer'd greatly, both with those
That lov'd me, and alone; on shore, and when
Thro' scudding drifts the rainy Hyades
Vext the dim sea: I am become a name;
For always roaming with a hungry heart
Much have I seen and known: cities of men
And manners, climates, councils, governments,
Myself not least, but honour'd of them all;
And drunk delight of battle with my peers,
Far on the ringing plains of windy Troy.
I am a part of all that I have met;
Yet all experience is an arch wherethro'
Gleams that untravell'd world, whose margin fades
For ever and for ever when I move.
How dull it is to pause, to make an end,
To rust unburnish'd, not to shine in use!
As tho' to breathe were life. Life piled on life
Were all too little, and of one to me
Little remains; but every hour is saved
From that eternal silence, something more,
A bringer of new things; and vile it were
For some three suns to store and hoard myself,
And this grey spirit yearning in desire
To follow knowledge like a shining star,
Beyond the utmost bound of human thought.
This is my son, mine own Telemachus,
To whom I leave the sceptre and the isle—
Well loved of me, discerning to fulfil
This labour, by slow prudence to make mild
A rugged people, and thro' soft degrees
Subdue them to the useful and the good.
Most blameless is he, centred in the sphere
Of common duties, decent not to fail
In offices of tenderness, and pay
Meet adoration to my household gods,
When I am gone. He works his work. I mine.
There lies the port: the vessel puffs her sail:
There gloom the dark broad seas. My mariners,
Souls that have toil'd, and wrought, and thought with me—
That ever with a frolic welcome took
The thunder and the sunshine, and opposed
Free hearts, free foreheads—you and I are old;
Old age hath yet his honour and his toil;
Death closes all; but something ere the end,
Some work of noble note, may yet be done,
Not unbecoming men that strove with gods.
The lights begin to twinkle from the rocks:
The long day wanes, the slow moon climbs, the deep
Moans round with many voices. Come, my friends,
'Tis not too late to seek a newer world.
Push off, and sitting well in order smite
The sounding furrows; for my purpose holds
To sail beyond the sunset, and the baths
Of all the western stars, until I die.
It may be that the gulfs will wash us down;
It may be we shall touch the Happy Isles,
And see the great Achilles, whom we knew.
Tho' much is taken, much abides; and tho'
We are not now that strength which in old days
Moved earth and heaven; that which we are, we are;
One equal temper of heroic hearts,
Made weak by time and fate, but strong in will
To strive, to seek, to find, and not to yield.

THE ISLE OF LONG AGO

Benjamin Franklin Taylor was one of the lesser-known American poets. He lived from 1819 to 1887, and wrote many pleasant verses and much good prose. The following, if somewhat sentimental, is still tuneful and tender, and may be given as a good example of his once popular poems.

OH, a wonderful stream is the river of Time,
As it runs through the realm of Tears,
With a faultless rhythm and a musical rhyme,
And a boundless sweep and a surge sublime,
As it blends with the ocean of Years.

How the winters are drifting, like flakes of snow,
And the summers, like buds between;
And the year in the sheaf—so they come and they go,
On the river's breast, with its ebb and flow,
As it glides in the shadow and sheen.

There's a magical isle up the river of Time,
Where the softest of airs are playing;
There's a cloudless sky and a tropical clime,
And a song as sweet as a vesper chime,
And the Junes with the roses are staying.

And the name of that Isle is the Long Ago,
And we bury our treasures there;
There are brows of beauty and bosoms of snow—
There are heaps of dust—but we loved them so!—
There are trinkets and tresses of hair

There are fragments of song that nobody sings,
And a part of an infant's prayer,
There's a lute unswept, and a harp without strings;
There are broken vows and pieces of rings,
And the garments that she used to wear.

There are hands that are waved, when the fairy shore
By the mirage is lifted in air;
And we sometimes hear, through the turbulent roar,
Sweet voices we heard in the days gone before,
When the wind down the river is fair.

Oh, remembered for aye be the blessed Isle,
All the day of our life till night—
When the evening comes with its beautiful smile,
And our eyes are closing to slumber awhile,
May that "Greenwood" of Soul be in sight.

THE PATRIOT

The first line of this poem by Robert Browning is one which is often quoted. The poem was written to illustrate the fickleness of popular applause. History abounds in examples of men who have been hailed as heroes by the mob and a little later have been hounded to death by the same mob. The wise man is he who has the strength to look with contempt upon the favor of the crowd, knowing that they who acclaim him a patriot or a hero would as readily, if it served their purpose, denounce him as a traitor or a humbug. The finest illustration of how the opinion of the ignorant mob can change is to be found in Shakespeare's play of "Julius Cæsar," by noting how the same people who applaud Brutus turn round and applaud his enemy, and their own worst friend, Antony.

IT was roses, roses, all the way,
With myrtle mixed in my path like mad;
The house-roofs seemed to heave and sway,
The church-spires flamed, such flags they had,
A year ago on this very day.

The air broke into a mist with bells,
The old walls rocked with the crowd and cries.
Had I said, "Good folk, mere noise repels;
But give me your sun from yonder skies!"
They had answered, "And afterward, what else?"

Alack, it was I who leaped at the sun
To give it my loving friends to keep!
Naught man could do have I left undone:
And you see my harvest, what I reap
This very day, now a year is run.

There's nobody on the house-tops now—
Just a palsied few at the windows set;
For the best of the sight is, all allow,
At the Shambles' Gate; or, better yet,
By the very scaffold's foot, I trow.

I go in the rain, and, more than needs,
A rope cuts both my wrists behind;
And I think, by the feel, my forehead bleeds,
For they fling, whoever has a mind,
Stones at me for my year's misdeeds.

Thus I entered, and thus I go!
In triumphs, people have dropped down dead.
"Paid by the world, what dost thou owe
Me?"—God might question; now, instead,
'Tis God shall repay: I am safer so.

THE DEATH OF THE FLOWERS

It is perhaps pleasanter to sing of the coming of the flower-time and the radiant days of summer than of the waning season, when the flowers are disappearing before the chilling breath of winter. But all seasons have their beauty, and there have probably been as many poems in praise of winter as in praise of spring. There is beauty even in certain forms of sorrow, and it is the poet's part to express this beauty for us. In the following poem by William Cullen Bryant, our famous American writer, a close observer of Nature, this pale beauty of regret is finely conveyed.

THE melancholy days are come, the saddest of the year,
Of wailing winds, and naked woods, and meadows brown and sere.
Heap'd in the hollows of the grove, the autumn leaves lie dead;
They rustle to the eddying gust, and to the rabbit's tread.
The robin and the wren are flown, and from the shrubs the jay,
And from the wood-top calls the crow through all the gloomy day.

Where are the flowers, the fair young flowers, that lately sprang and stood
In brighter light and softer airs, a beauteous sisterhood?
Alas! they all are in their graves; the gentle race of flowers
Are lying in their lowly beds with the fair and good of ours.
The rain is falling where they lie; but the cold November rain
Calls not from out the gloomy earth the lovely ones again.

The wind-flower and the violet, they perish'd long ago,
And the brier-rose and the orchis died amid the summer glow;
But on the hill the golden-rod, and the aster in the wood,
And the yellow sunflower by the brook, in autumn beauty stood
Till fell the frost from the clear, cold heaven, as falls the plague on men,
And the brightness of their smile was gone from upland, glade, and glen.

And now, when comes the calm, mild day, as still such days will come,
To call the squirrel and the bee from out their winter home;
When the sound of dropping nuts is heard, though all the trees are still,
And twinkle in the smoky light the waters of the rill,
The south wind searches for the flowers whose fragrance late he bore,
And sighs to find them in the wood and by the stream no more.

And then I think of one who in her youthful beauty died,
The fair, meek blossom that grew up and faded by my side.
In the cold, moist earth we laid her when the forest cast the leaf,
And we wept that one so lovely should have a life so brief;
Yet not unmeet it was that one, like that young friend of ours,
So gentle and so beautiful, should perish with the flowers.

ON THE GRASSHOPPER AND CRICKET

What we have written on the "Death of the Flowers" is curiously confirmed in this little poem by John Keats, one of the great English poets, of whom we read in this book.

THE poetry of earth is never dead:
When all the birds are faint with the hot sun
And hide in cooling trees, a voice will run
From hedge to hedge about the new-mown mead.

That is the Grasshopper's—he takes the lead
In summer luxury—he has never done
With his delights; for, when tired out with fun,
He rests at ease beneath some pleasant weed.

The poetry of earth is ceasing never:
On a lone winter evening, when the frost
Has wrought a silence, from the stove there shrills
The Cricket's song, in warmth increasing ever,
And seems, to one in drowsiness half lost,
The Grasshopper's among some grassy hills.

LITTLE VERSES FOR VERY LITTLE PEOPLE

IF all the world were apple pie,
And all the sea were ink,
And all the trees were bread and cheese,
What should we have to drink?



HERE we go up, up, up,
And here we go down, down, downy;
And here we go backwards and forwards,
And here we go round, round, roundy.

MILLIONS of massive raindrops
Have fallen all around;
They have danced on the house-tops,
They have hidden in the ground.

They were liquid-like musicians
With anything for keys,
Beating tunes upon the windows,
Keeping time upon the trees.

BLOW, wind, blow! and go, mill, go!
That the miller may grind his corn;
That the baker may take it, and into rolls make it,
And send us some hot in the morn.

NOW, all of you, give heed unto
The tale I now relate,
About two girls and one small boy,
A cat, and a green gate.

Alack! Since I began to speak—
And what I say is true—
It's all gone out of my poor head,
And so, good-bye to you

EVERY lady in this land
Has five nails upon each hand,
Twenty on her hands and feet.
All this is true, without deceit.

THERE was an old woman who had three sons,
Jerry and James and John;
Jerry was hung, James was drowned,
John was lost, and never was found;
And there was an end of her three sons,
Jerry and James and John!

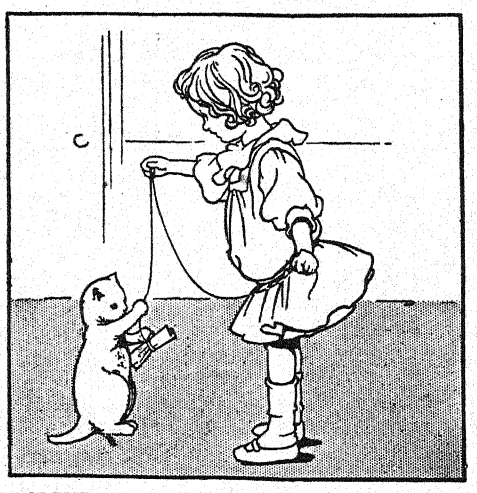
"IS John Smith within?"
"Yes, that he is."
"Can he set a shoe?"
"Ay, marry, two,
Here a nail, there a nail,
Tick, tack, too."

I SAW a ship a-sailing
A-sailing on the sea;
And, oh, it was all laden
With pretty things for thee!

There were comfits in the cabin,
And apples in the hold;
The sails were made of silk,
And the masts were made of gold.

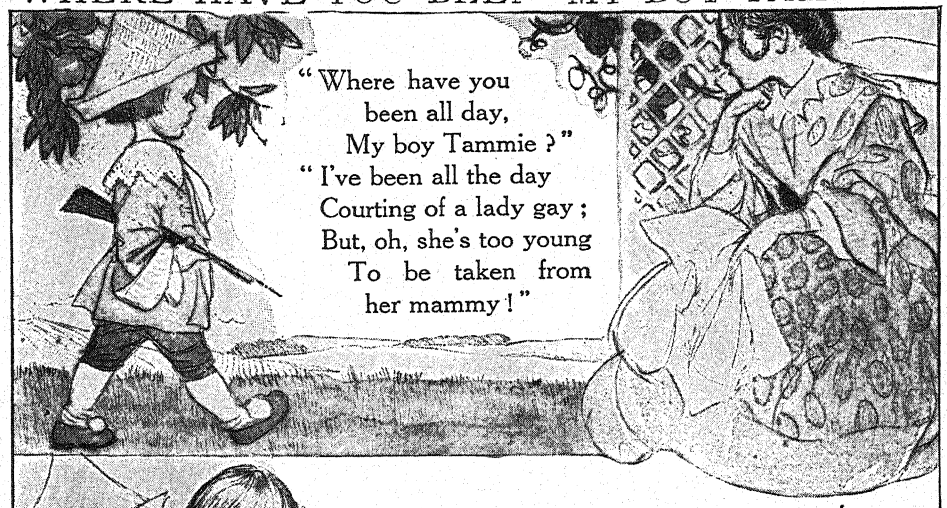
The four-and-twenty sailors
That stood between the decks,
Were four-and-twenty white mice,
With chains about their necks.

The captain was a duck,
With a packet on his back,
And when the ship began to move,
The captain said, "Quack, quack!"



HEY, my kitten, my kitten,
And hey, my kitten, my deary;
Such a sweet pet as this
Was neither fat nor weary.

WHERE HAVE YOU BEEN MY BOY TAMMIE?



"Where have you
been all day,
My boy Tammie?"
"I've been all the day
Courting of a lady gay;
But, oh, she's too young
To be taken from
her mammy!"



"What work can she do,
My boy Tammie?
Can she bake and can she brew,
My boy Tammie?"



"She can brew and she can bake,
And she can make our wedding cake;
But, oh, she's too young
To be taken from her mammy!"



"What age may she be—
What age may she be,
My boy Tammie?"

"Twice two, twice seven,
Twice ten, twice eleven;
But, oh, she's too young
To be taken from her mammy!"

THE BOGIE MAN

Words by ALFRED P. GRAVES

Music by permission of MESSRS. SCHOTT & Co.

Lively

f

1. A ro - guey, po - guey Bo - gie Man goes danc-ing thro' our hous-ey pouse. A
2. A ro - guey, po - guey Bo - gie Man goes rov-ing thro' our hous-ey pouse. A

mf

ro - guey, po - guey Bo - gie Man goes danc-ing thro' our house. He
ro - guey, po - guey Bo - gie Man goes rov - ing thro' our house. He

mf

takes him-self and shakes him - self till in - to bits he breaks him-self! A
bends him-self and bends him - self and breaks him-self and mends him-self! A

f

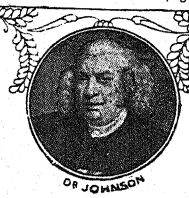
1st time. D.S. | *2nd time.*

ro - guey, po - guey Bo - gie Man goes rov-ing thro' our house. He house.
ro - guey, po - guey Bo - gie Man goes rov-ing thro' our house. He house.



SOME GREAT ENGLISH WRITERS

CONTINUED FROM 4634



ELSEWHERE in this book we may read the life-stories of the famous English poets and novelists, and we are now to learn about the lives of other writers who were distinguished for achievements of different kinds. In what is known as "the essay," or the writing of short and pleasing discourses on almost any sort of subject, there are two names which always come uppermost when we think of the English authors who have excelled in this form of literature. Addison and Steele were friends and fellow-workers during a great part of their lives, though unhappily they quarreled at the end.

It would be difficult to find two men more unlike each other, and it was perhaps just because they were so different that they so long succeeded in working together, as people seem most ready to admire in their friends the qualities they themselves do not possess. Certainly it was due to Addison and Steele that a considerable amount of delightful work was added to English literature. They were by no means the originators of the essay, as a hundred years before them the great English statesman and scholar, Sir Francis Bacon, afterwards Lord Verulam, had written many essays which are justly considered among the classic treasures of our language. Bacon lived in the great age of Shakespeare, when the English tongue had just changed from its older form into what we call "modern English," but it still retained some quaint words and curious phrases of the old-fashioned speech. But by the end of the seventeenth century, when Addison and Steele flourished, it had shaped itself very closely to the educated speech of our own time, though many words were still pronounced differently, as indeed the language is constantly changing, enriching itself with new words to express new ideas and changing old words into new meanings.

The seventeenth century, and more particularly the eighteenth were periods of history in which the English people were more formal and pompous in their manners than they are to-day, with the result that their written speech took on a certain stiffness and strove always to be "elegant," just as though a person were always dressed up for some ceremony, and never knew the delight of taking one's ease in old clothes. We can see this as we read the essays of Addison and Steele. They are full of stately phrases, and courtly compliments and bows. Their writers are always

bent on showing us how well-bred are their manners. There is just a suspicion that they are looking in their mirrors, and are much pleased with themselves. They wrote long before the days of the modern newspaper, whose purpose is to chronicle the events of the fleeting hour, to record the history of the world from day to day. People were not in a hurry then; telegraphs, telephones, and railway trains were still undiscovered secrets.

THE FAMOUS JOURNALS IN WHICH THE GREAT ESSAYISTS WROTE

But Addison and Steele set themselves to entertain and instruct their countrymen by writing on all sorts of subjects, and printing their essays in periodical form. Thus "The Tatler," first issued on April 12, 1709, was quite a tiny sheet, published three times a week at one penny. In all, two hundred and seventy-one numbers appeared, of which Steele wrote one hundred and eighty-eight, while Addison wrote only about forty, but joined with Steele in writing about thirty-five of the issues. The remainder were from other pens. A feature of "The Tatler" had been an imaginary club of gentlemen known as "The Spectator Club"; and two months after "The Tatler" came to an end, "The Spectator," on very similar lines, was started as a daily paper, Addison writing no less than two hundred and seventy-four numbers. "The Spectator" ceased on December 6, 1712, after five hundred and fifty-five numbers had appeared; but two years later it was resumed again, and eighty more numbers of the famous paper were published.

HOW ADDISON AND STEELE SPOKE TO THE PEOPLE OF THEIR DAY

It is very difficult for us to-day to realize how much the writings of these men in the papers mentioned affected the life of their time. This was really the first great triumph of the printing-press. None of the famous novelists who afterwards arose to enthrall the public with their stories had yet given evidence of their powers. Books were by no means numerous, newspapers were still in their infancy; but here, in those little printed sheets, were men of great intelligence speaking to their fellow-countrymen every day, writing them letters, as it were, full of wisdom and wit and shrewd observation. They were, in a sense, great preachers, and these little papers were their pulpits, from which they addressed immensely greater congregations than ever any preacher could reach with the spoken word. And to-day the essays in "The Spectator" and "The Tatler" are still read, and influence the thoughts of their readers two centuries after they were written.

Joseph Addison was born on May 1, 1672, the son of a poor clergyman who afterwards became Dean of Lichfield. Both he and Steele were scholars together at the famous Charterhouse School in London. Addison afterwards distinguished himself at Oxford, and had the luck to write some verses in praise of the king, which secured him a pension of $1,500 a year, and enabled him to travel on the Continent to go on with his education. But when King William died, the poet lost his pension, and knew the pinch of poverty for a time; until, with an eye to further profit, he wrote another poem celebrating the victory of Blenheim and praising the great military hero Marlborough.

THE END OF JOSEPH ADDISON'S HONORED AND USEFUL LIFE

This was more than generously rewarded by the gift of an official appointment, whence he rose to be one of the principal secretaries of state. Those were the days when the two great political parties were known as Whigs and Tories. Addison supported the former, and devoted his pen to their service; and if he made good profit out of his politics, receiving a splendid pension when he retired, a year before his death, we need grudge him nothing that he earned, as his services to literature were far beyond the rewards of mere money.

Like many other famous men it is said that he was not happy in his marriage. His wife was the Dowager Countess of Warwick, and in the later years of his life his happiest days were spent in meeting his old friends at a London tavern. He was only forty-seven when he died, on June 17, 1719, and on his death-bed he said to his step-son: "See how a Christian can die."

His friend, Richard Steele, was a rollicking Irishman, born, it is said, on March 12, 1672, though some authorities maintain that he was three years younger

THREE MASTERS OF ENGLISH PROSE



Joseph Addison and Richard Steele were two great friends who lived and wrote in the days of Queen Anne. They founded two papers, called "The Tatler," and "The Spectator," which they filled with clever essays on all sorts of subjects. Steele was devoted to his friend, who often dictated his essays to him, as we see here.



Edward Gibbon was the author of one of the greatest histories that have ever been written. When on a visit to Rome, he was sitting one evening in a church that had once been an ancient temple, standing high on the Capitol Hill, and some barefooted friars were singing the vespers, as we see here. Suddenly, as he sat thinking, there flashed into his mind the idea of telling the story of how the tremendous temples and palaces of this wondrous city fell into decay, and "The Decline and Fall of the Roman Empire" was the result.

than Addison. Thackeray says of him: "I am afraid no good report could be given by his masters and ushers of that thick-set, square-faced, black-eyed, soft-hearted little Irish boy. He was whipped deservedly a great number of times. Though he had very good parts of his own, he got other boys to do his lessons for him, and only took just as much trouble as should enable him to scuffle through his exercises, and by good fortune escape the flogging-block."

THE UPS AND DOWNS OF RICHARD STEELE THE FRIEND OF ADDISON

He went to Oxford, but left the university without taking a degree and went into the army as a trooper. By taking this step he lost an estate which his uncle refused to leave him. His colonel, however, found out his capacity, made him his secretary, and got him a commission. By and by, he wrote a book "The Christian Hero," at which his fellow-officers laughed, but which attracted the attention of King William III. Then he tried his hand at writing for the stage; but he soon abandoned dramatic authorship, and we next hear of him, in 1706, as gentleman-waiter to Prince George of Denmark. His affairs prospered for a time, and from 1709 onwards he was pouring out those brilliant essays for "The Tatler." He became a Member of Parliament, but was expelled for writing in favor of the house of Hanover. On the death of Queen Anne, however, when the Hanoverian King George I., came to the throne, he was rewarded with an official post. But he was by nature improvident and careless, and was always in difficulties. Toward the end of his life he fell ill. He was no longer able to work, so he left London and went to live near Carmarthen in Wales, where he died in September 1729.

DR. SAMUEL JOHNSON, THE SON OF A HUMBLE BOOKSELLER

We turn now to one of the greatest figures in all literary history, though, strangely enough, his achievements in authorship are comparatively small. Doctor Samuel Johnson ranks among the immortals more by reason of his strong and picturesque personality than because of his literary achievements. His father was a bookseller at Lichfield, where Samuel was born on September 18, 1709. He was a heavily-built, ungainly youth, lazy and untidy, disinclined for boyish pursuits, and interested only in the contents of his father's shop. He was taken from school when he was sixteen, and stayed at home for two years, devouring every book that came into his hands. He went to Oxford University in 1729, but his father's business had become poor, and he was obliged to leave within three years without taking a degree.

His father died soon afterwards, and the great lumbering fellow tried to earn his living as a teacher in a grammar-school, but did not succeed. But, in spite of all his failures, there was probably no one of his years who had read so much or had a better title to be called a "scholar." His knowledge was universal, and he declared that there was no book that was not worth reading for the sake of some fragment of knowledge that it added to one's store.

At that time publishing was a very different business from what it is to-day. It was then the custom for a number of booksellers to combine, and to get an author to write or translate a book for them, which they sold in their own shops.

THE HARDSHIPS OF DR. JOHNSON'S EARLY LIFE AS AN AUTHOR IN LONDON

In 1733 Johnson went to Birmingham, where he did translating for booksellers, and also wrote for a provincial paper. In that town, two years later, he married a widow twenty years older than he. With some money which he got from her, he set up a school near Lichfield, where, at the end of eighteen months, he had succeeded in getting three pupils.

He was thus a failure as a schoolmaster, just as he had been as an assistant. But there was no gainsaying the richly-stored mind of the man. He had something greater than mere routine success. In the ample leisure of his teaching he had written a tragedy, "Irene," and one day, in 1737, with this in his pocket, he set out for London with one of these three pupils, a brisk young man of twenty, who was going to study for the Bar, but who very soon became London's greatest actor, David Garrick.

In the great city Johnson had to turn his pen to many uses, and knew the bitterness of writing much for little pay. He was a literary hack. He wrote for a publisher named Cave, who issued "The

Gentleman's Magazine," in which Johnson used to write every month an account of the debates in Parliament from information received at second-hand. He translated; he wrote poems, one a long satire, entitled "London," for which, though a success when published, he received only about fifty dollars. Meanwhile, Garrick had come to the front as an actor, and he produced his old master's tragedy, "Irene," for which he paid $1,500, though the play was not a success.

DR. JOHNSON'S GREAT DICTIONARY OF THE ENGLISH LANGUAGE

Then, in 1747, for a group of booksellers, Johnson began his famous "Dictionary of the English Language," which took him seven years to complete, and on which he employed many assistants. While it was still proceeding, he published twice weekly for a time an essay-journal, like "The Spectator," called "The Rambler," and later he ran for two years a similar publication, "The Idler." In these some of his most characteristic work appears.

Although his wife was so much older than he and was quite without literary taste or culture, they had lived very happily together, and her death, in 1752, was a deep and abiding sorrow to him. But he toiled away at his work with an energy no one who knew him as a youth would have expected—an energy, we cannot but think, that came chiefly from the need to earn his bread. When his mother died, in 1759, he wrote a fanciful story entitled "Rasselas," the payment for which he designed to meet the expenses of his mother's funeral. It is so good a piece of literature that it is probably more read to-day than anything else of his; and it met with immediate success. Johnson received $500 for it, and a further sum of $125 when it went into a second edition.

JAMES BOSWELL, WHO WROTE THE FAMOUS "LIFE" OF DR. JOHNSON

In the year 1762 the scholarly attainments of Johnson and his literary services were very generously recognized by the king granting him a pension of $1,500 per annum. He lived for twenty-two years more, and during that time did very little work, beyond writing his "Lives of the Poets," in which his wide reading and literary knowledge are seen to great advantage, if his opinions are not always to be accepted.

It was in 1763 that he became friends with James Boswell, a Scottish advocate and man of letters. Although he had many friends far more notable than Boswell, and was the founder of a literary club whose membership included such illustrious names as those of Burke, Goldsmith, Gibbon, Reynolds, and Garrick, it is to Boswell that no small share of the fame which the name of Johnson enjoys in literary history is due. For, after Johnson's death, which occurred on December 13, 1784, Boswell wrote a great "Life" of the friend whom he admired so much, and so well did he compile his materials that it may be described as the finest book of its kind in the world. Indeed, Boswell's "Life of Johnson" has probably been more read than any of Johnson's own writings.

Boswell had the good sense to realize how rare and great a man was this ungainly, snuffy old fellow, who loved to sit in tavern chairs and discourse on life and literature, often advancing his opinions with much rudeness to others present, but more often uttering things worthy to be remembered. So the fussy Scotsman very diligently made notes of Johnson's sayings, and these he set forth with great skill and effect in his famous biography. The grave of Dr. Johnson is in Westminster Abbey.

DAVID HUME, THE LEARNED HISTORIAN AND PHILOSOPHER

David Hume, famous as a historian and philosopher, is the next great English writer who calls for attention. It is true that he was a Scotsman, but as he wrote in the English language he was an English man of letters, and must, of course, be included here. Hume's proper name was Home. He came of a distinguished family, but chose thus to alter his name. He was born in Edinburgh on April 26, 1711, and studied at the university there. It was originally intended that he should be a lawyer, but he preferred literature to law, and though later on he engaged in commerce for a time at Bristol, he was clearly unsuited for it. A stay in France from his twenty-third to his twenty-sixth year had much to do with directing his mind towards the serious questions of life and thought. But his first book was a failure, and his second only a moderate success. They were, of course, on subjects no young

person would trouble his heard about, and showed a great deal of knowledge; but, for all that, Edinburgh University did not make him a professor, as he would have liked, in 1745.

The next few years he spent first as companion to a young nobleman, and later as secretary to a general officer. In this way he was able to travel a good deal, and he seems to have been so careful with his money that he gathered together five thousand dollars, which he considered quite a fortune!

HOW HUME ACHIEVED SUCCESS AFTER FAILURE AND DISAPPOINTMENT

Failing to secure the Edinburgh professorship, he did not despise the position of librarian to the Advocates' Library, Edinburgh. If the salary was small, the duties were not heavy, and he had at his command a splendid collection of books of reference for his own use. It was while so employed that he began his great "History of England."

The first published volume did not succeed as well as Hume expected. His disappointment was intense, but in due course the succeeding volumes appeared, and as England had but recently emerged from her successful struggle with France, capturing the rich prize of Canada, readers were more alive to the interest of history, and Hume's work came into favor. When it was completed he was famous. It would be difficult to give a better instance of how failure may be converted into triumph by a man simply doing the best of which he is capable.

In France, as well as in England and his native Scotland, Hume now enjoyed a great reputation, and held an important Government post for a time. A good-natured, simple, unaffected man, David Hume had many friends, and the beautiful clearness of his literary style, together with the attention given to the life and actions of the people as well as to their rulers made his historical writings interesting and valuable. He died on August 25, 1776.

EDWARD GIBBON, WHO WROTE THE FINEST HISTORY BOOK IN THE WORLD

During the year in which David Hume died, the first volume of the greatest historical work written in the English language was published; and the dying historian was able to praise the younger man who was achieving even greater things than he himself had accomplished. Edward Gibbon was the name of the new historian; his work, "The Decline and Fall of the Roman Empire." Despite all the histories that have been written during the last century and a half, this great work remains, and is likely long to stand the masterpiece of its class.

Gibbon, who was rather a queer sort of boy, was born at Putney, now a part of London, but then a rural village, on May 8, 1737. His father was a country gentleman. His mother died when he was young. So an aunt undertook the care of the strange, nervous little boy, whose head seemed almost too big for his body. He was sent to Westminster School when twelve years old. There for two years he led a very unhappy life. About two years later, he went to Oxford, where he was noted more for the out-of-the-way nature of the knowledge he had acquired by his ill-ordered reading at home and school, and his ignorance of the commonest affairs, than for any student-like qualities.

GIBBON'S LIFE BY THE BLUE WATERS OF LAKE GENEVA

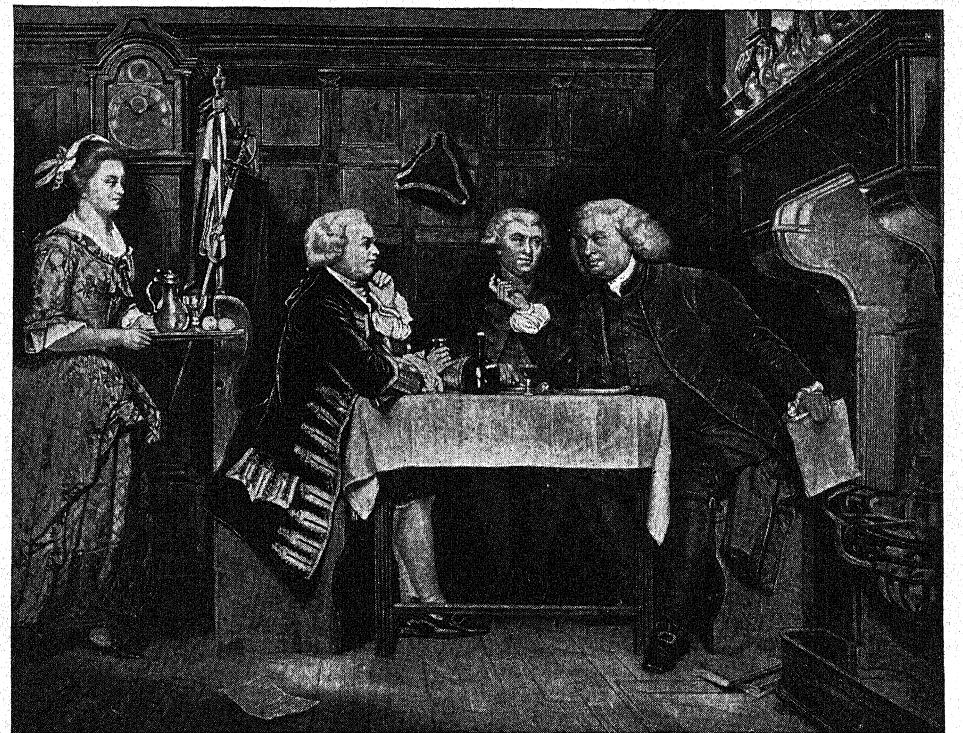
Gibbon was only seventeen when his father decided to send him abroad, not only for the sake of his education, but in order to change his religious views. The youth at Oxford had been inclined to the Roman Catholic Church, so his father chose to place him under a Protestant pastor at the beautiful town of Lausanne, on the Lake of Geneva. There, owing to the influence and teaching of the pastor, the young man returned to the Protestant faith, to which he ever after adhered.

For five years he continued to live by the blue waters of the famous lake, in the household of the French pastor, during which time he carried on such studies in French and Latin literature that stored his mind, thanks to his wonderful memory, with historical knowledge unequaled by any other of his age. It was during these early days in Lausanne—for to the end of his life Gibbon was fated to have association with that town—that the only romance of his quiet and bookish life took place. He was about twenty years of age, a small-boned and very thin youth at the time. The young lady was Mademoiselle Suzanne Curchod, and she was the daughter of a poor village pastor living in Burgundy. She was clever, but natural; refined, but not priggish;

THE MAN WHO MADE A GREAT DICTIONARY



Before the days of cheap printing, and when books found few readers, the poorer authors used to seek the patronage of rich and influential men. In this picture we see Dr. Samuel Johnson waiting in the ante-chamber of Lord Chesterfield's house. Dr. Johnson was disappointed in his hope of receiving help from the peer, but pushed on with his work in spite of all difficulties. He compiled the first large English dictionary.



Dr. Johnson lived and worked in London, in the centre of the district in which the great newspapers and books are now printed. He had many friends whose names are famous in literature and art—Burke, Gibbon, Reynolds, and Garrick among them. He used to meet his friends in the coffee-taverns of Fleet Street, and in this picture we see him in the Mitre Tavern, with Boswell on his right and Oliver Goldsmith facing him.

Gibbon found her everything that he considered a woman should be. He made visits to her father's house in Burgundy, and saw the young lady there in the charming atmosphere of a very poor, but very refined, home circle. His heart told him that here was his hope of earthly happiness. But on a visit home he learned that his father would not hear of such a match.

"Without his consent," says Gibbon, "I was myself destitute and helpless. I sighed as a lover; I obeyed as a son."

It is a strange fact that these two young people, who met in early life, and cared for each other when they were both poor, humble, and obscure, should both live to become famous. But so it happened. It was at Lausanne, where he had first met the charming daughter of the poor pastor, that Gibbon concluded his immortal history, and became one of the first men in Europe.

THE FAMOUS WOMAN WHO MIGHT HAVE BEEN THE WIFE OF A FAMOUS MAN

On the death of her father, Suzanne Curchod, left penniless, retired to Geneva, and there kept body and soul together for herself and her mother by teaching. It chanced that M. Necker, one of the richest bankers in Paris, came on a visit to his native city, and there fell in love with the humble and beautiful governess. He married her, and took her to Paris. M. Necker became one of the greatest statesmen in France, his wife became famous for her beauty and her goodness, and their daughter, Madame de Staël, attained world-wide celebrity, which continues to this day.

When touring in Italy in 1764–65, Gibbon sat musing amid the ruins of the Capitol of Rome, while some barefooted friars were singing vespers in a church that had once been the Temple of Jupiter. It was then that the idea of writing the most fascinating story in all history came to him, the decline and fall of the wonderful city among whose ancient ruins he was musing. But not until two years after his father's death, which took place in 1770, and put him in possession of a moderate fortune, did he begin the great task. He had then settled in London, where he was a friend of Dr. Johnson and a member of his literary club, and he succeeded Goldsmith as Professor of Ancient History at the Royal Academy. Gibbon was a member of Parliament for nine years, but retired in 1783. He then went back to Lausanne, and four years later had finished the work of his life on which his fame will rest secure.

THE END OF A GREAT TASK, AND THE WRITING OF AN IMMORTAL WORK

Gibbon never married. The romance of his boyhood lasted to the day of his death. But the writing of his great history was, perhaps, the true romance of his life. "It was on the day—or, rather, night—of June 27, 1787," he tells us, "between the hours of eleven and twelve, that I wrote the last page, in a summer-house in my garden. After laying down my pen, I took several turns in a *berceau*, or covered walk of acacias, which commands a prospect of the country, the lake, and the mountains. The air was temperate, the sky was serene, the silver orb of the moon was reflected from the waters, and all Nature was silent. I will not dissemble the first emotions of joy on recovering my freedom, and, perhaps, the establishment of my fame. But my pride was soon humbled, and a sober melancholy was spread over my mind, by the idea that I had taken an everlasting leave of an old and agreeable companion, and that whatsoever might be the future fate of my history, the life of the historian must be short and precarious."

Gibbon is described as a dutiful son, a tender, generous friend; and Lord Brougham said of him that "his honourable and amiable disposition, his kind and even temper, were praised by all."

GIBBON'S LAST DAYS, AND THE CHARACTER OF CHARLES LAMB

His great merit as a historian is the unique power of describing in glowing and stately phrases the most intricate masses of historical facts, so that they seem to pass before the mind's eye like a splendid and orderly pageant. Broken in health, Gibbon returned to London in 1793, and there died suddenly on January 16, 1794.

With the next famous author who steps forth to us from the past it is equally certain that his chief delights were found in books and writing. Ill-health, physical disadvantages, feeble nerves, and a dread of insanity were

the inheritance of Charles Lamb. And perhaps because all these disadvantages kept him confined to his study with his books, and forced him, in a sense, to the solace of literature, he has left to us a very precious legacy in the shape of the most charming essays in our language. Had we known him personally, with his stuttering speech, his moody and melancholy ways, we might not have taken to him so readily as we do in his written word, which reveals to us one of the gentlest and most lovable of characters.

THE BLUE-COAT BOY WHOM ALL THE WORLD LOVES

Lamb was a true Londoner, being born on February 10, 1775, in Crown Office Row, Inner Temple, the son of a lawyer's clerk; and a lover of London he remained to the last. Indeed, when we think of the many famous men of letters who have lived and died in London, and try to picture them as they walked its old streets and by-ways, the image of Charles Lamb comes as quickly to our mind as that of Doctor Johnson. His life, though uneventful in the main, was really a tragedy in which he quietly played the part of hero.

He was educated at Christ's Hospital, where, of course, he wore the long, ugly blue coat and loud yellow stockings of the "Blue-coat Boys," one of whom at that time was Samuel Coleridge, the future poet. At seventeen, Charles Lamb entered the service of the East India Company, in which quiet and well-paid employment he remained until 1825, when he retired on a liberal pension. He was thus spared the need to struggle for his living, as so many literary men have had to do; his literary work was the pleasant occupation of his ample leisure.

THE TRAGEDY IN THE SAD LIVES OF CHARLES AND MARY LAMB

His battle was of another and more terrible nature. When he was twenty-one the great tragedy of his life occurred. There was insanity in his family, on his mother's side, and in 1796 his elder sister Mary, in a fit of madness, killed her mother. The poor young woman was for a time placed in a hospital, but on Charles giving a solemn undertaking to watch over and guard her through life, she was released when she was for a time restored to health. To this sacred trust he was true all the days of his life, giving up all thoughts of married happiness for himself.

In all the strange and beautiful stories of men and women, we doubt if there is anything more pathetic than that of Charles and Mary Lamb. For often again during her life was Mary visited with fits of mental illness. Both she and her brother knew when these were coming on. Charles would then take his sister by the hand, and lead her away to the hospital, where she would remain until the clouds that had gathered round her mind had cleared away again.

Despite this great sorrow, the gentle and beautiful characters of these two people were not without their times of happy reward. Often the two worked together in their literary pursuits; their "Tales from Shakespeare" and their "Poetry for Children" are among the memorials of these serener days of happy literary companionship. But the fame of Charles Lamb rests chiefly on his "Essays of Elia," so called from the name under which he wrote them, suggested to him by the actual name of a colleague in the East India House.

THE END OF CHARLES LAMB'S LIFE OF QUIET HEROISM

Lamb was a great writer of letters, and his friendships included most of the famous literary people of his time. No one has excelled him in the observation of everyday life, of the knowledge of human feelings; nor has any approached him in the quiet and gently humorous expression of his thoughts and fancies. The last years of his life were spent at Edmonton, near London. He died there on December 27, 1834, and was buried in Edmonton churchyard. He had been true all his life to his promise to watch over his sister. She survived him for thirteen years, but towards the end of her life she had to be kept under continual restraint. When at length her life of trial ceased, she was laid to rest by the side of her brother.

A friend of Charles Lamb, three years his junior, had died four years before him, Lamb being the only one of his old friends present at his funeral. This was William Hazlitt, the essayist and critic. Hazlitt was born at Maid-

stone, on April 10, 1778, the son of a Unitarian minister. He, too, was intended for the ministry, but gave up the idea, and tried his hand at portrait-painting before he turned to literature. His first work, "Principles of Human Action," was published in 1805.

THE SAD LIFE OF WILLIAM HAZLITT, THE ESSAYIST AND CRITIC

He engaged in many different kinds of writing, and contributed to all sorts of journals and magazines, for the time had now come when periodical literature was greatly on the increase, and the field of the miscellaneous writer wide and varied.

Hazlitt is certainly among the foremost writers of our language, and in his essays we find him most often expressing, in perfect phrases, wise and illuminating thoughts on all sorts of subjects, though at other times he can contrive to be curiously heavy. His works have not the even beauty of Charles Lamb's, but his knowledge of literature was no less wide and deep, and where he fails it is chiefly due to his own character, which lacked the winning qualities that distinguished Charles Lamb.

Hazlitt's married life was unhappy, and for that he was himself much to blame. He quarreled with most of his friends, and his days came to an end in poverty and sorrow, when he died of cholera in London, on September 18, 1830.

THOMAS DE QUINCEY, THE STRANGE SON OF A WEALTHY MERCHANT

The next figure that attracts our notice as we look back upon these famous writers of the past is the strangest of all. The life of Thomas de Quincey would require quite a long book to give any proper idea of its eccentricity. His father was a wealthy Manchester merchant, and the boy was born in the great manufacturing town on August 15, 1785. His father died when Thomas was seven years old, and some years afterward his mother brought her family to Bath, and the boy attended the Bath Grammar School, where no scholar of his time was more alert of mind, and where he excelled in Latin verse. He afterwards went to school in Wiltshire, and traveled for a time in Ireland, before he was sent, in 1800, much against his will, to the Manchester Grammar School. Although only a boy in years, he seemed to have the intelligence of a grown man, and surprised all who met him by his knowledge. His mother now lived at Chester; and after eighteen months at the Manchester Grammar School he ran away, walking all the distance to his mother's house. He wanted no more schooling! Instead of going to college again, he received a small weekly allowance, and went wandering in Wales. His next move was to borrow money from friends and to make for London, where he had many adventures. Having severed connection with his family, he was at starving-point when they found him and brought him home.

When he was sent to Oxford University in 1803, his guardian allowed him only $500 a year; but as he was heir to a considerable fortune he found no difficulty in borrowing from money-lenders, and thus drew regularly from the bank of the future. His life at Oxford was quite eccentric; he paid no attention whatever to proper studies, but read just what he liked.

THE TERRIBLE HABIT THAT DARKENED DE QUINCEY'S LIFE

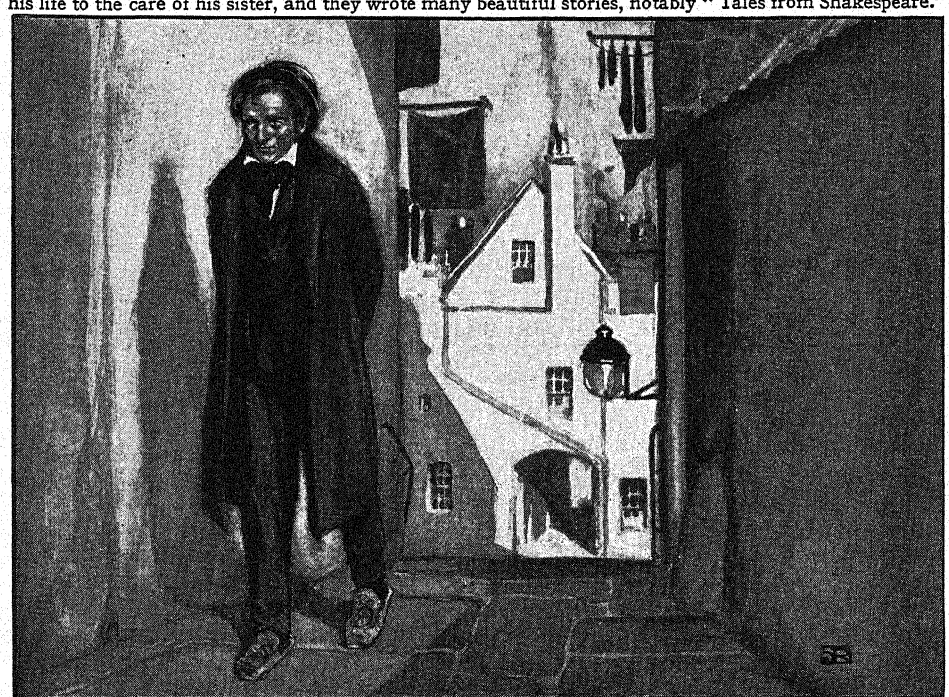
He had never been strong, and the privations of his life in London probably helped to bring on neuralgia, from which he suffered terribly while he was at Oxford. In the hope of relieving his pain, he commenced to take opium, and though he fought hard against it he never quite rid himself of the habit of taking this pernicious drug. He left the university in 1807, but not before he had visited London again and made many literary friends. Later, he became acquainted with Coleridge, and Lamb and Hazlitt were among his friends. While he was on a visit to Wordsworth and Southey at their homes in the Lake District, in 1809, he decided to settle there at Grasmere, and, gathering around him a fine library, began his literary work.

De Quincey wrote for many periodicals, but it was not until his "Confessions of an English Opium-Eater" were printed, in 1821, that his name became famous. He had been married now for five years, and as he had spent most of his money, he was compelled to support his family with his pen. The deep dejection which he suffered when the effects of opium were wearing off, and the struggles that he made to give up

CHARLES LAMB AND THOMAS DE QUINCEY



Charles and Mary Lamb were two of the gentlest and most beautiful characters who ever wrote English prose. They were poor, and a tragedy saddened Mary's life. Charles faced the world heroically and devoted his life to the care of his sister, and they wrote many beautiful stories, notably " Tales from Shakespeare."



This picture shows the strange, eccentric figure of Thomas de Quincey, shabbily dressed and in his slippers, walking through one of the old-fashioned streets of Edinburgh. A brilliant essayist and a witty talker, he led a curious life. He had a magnificent library, and, in addition, collected every paper and magazine he could. De Quincey wrote for periodicals. His most famous work is " The Confessions of an English Opium-Eater."

the habit of taking it, caused him much misery all his life, and took away much of the enjoyment that his work might have given him. He had a devoted wife, however, and a family of five sons and two daughters, so that, in spite of his suffering, he had a great deal of happiness in his life. Two of his sons afterwards gained some distinction as soldiers.

In 1828 De Quincey removed to Edinburgh, and for the remainder of his life lived there, with the exception of an occasional visit to Glasgow, where he might have been seen, the oddest of figures, a little shriveled man of five feet high, with a fine, intellectual head, shuffling along the streets dressed in worn and ill-fitting garments, with loose carpet slippers on his feet. His death took place at Edinburgh on December 8, 1859.

The last of the great writers with whom we are particularly concerned here is known to fame both as poet and historian. Thomas Babington Macaulay, though born at Rothley Temple, Leicestershire, on October 25, 1800, was of Scottish ancestry.

MACAULAY, THE CLEVER BOY WHO HATED MATHEMATICS

Like most of the others we have read about, he was an exceptionally clever boy, the one study he detested being mathematics. He passed from private schools to Cambridge University in 1818, and there carried off prizes for English verse and Latin oration. But, unlike many other celebrities, his college life was well-ordered, studious, and distinguished.

Macaulay was called to the Bar in 1826, but literature was his passion, and as he had made a name for himself the year before by an essay on Milton in "The Edinburgh Review," he made no effort to rise to a position at the Bar.

His great talents were now devoted to writing in "The Edinburgh Review," and his powers of oratory were seen to advantage in the House of Commons, where he became a distinguished member. His father, who had been a man of wealth, was so generous a giver to charities that he had almost impoverished his family; and chiefly for this reason Macaulay, at the age of thirty-four, accepted an important legal position in India with the splendid salary of $50,000 a year. But four years later he returned to England and again entered Parliament, and became Secretary for War. Many other important posts were later occupied by him, and no man's days can have been more packed with work, for he wrote continuously in addition to discharging his public duties.

THE WRITINGS THAT HAVE MADE LORD MACAULAY FAMOUS

His "Lays of Ancient Rome," in which he sang in swift and flowing verse some of the great deeds in Roman history, gave him world-wide popularity, while his collected essays were also read by everybody, and admired for the vigorous and direct style of the writing. His "History of England" had also an immense success, greater, perhaps, than any work of the kind had ever enjoyed. Yet as a historian he is least to be admired; for though his pages read well by reason of his splendid force of character, the swinging rhythm of his style, and the fine confidence of his statements, he was by no means careful of his facts, and sought effect rather than accuracy.

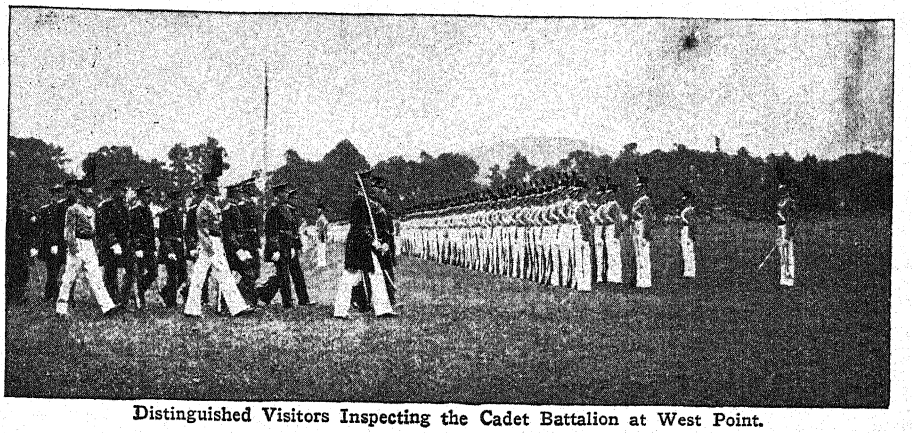
For all that, Lord Macaulay, who was raised to the Peerage in 1857, has a sure place among the great English writers. On December 28, 1859, he died in his armchair at Holly Lodge, Kensington, and was buried in Westminster Abbey.

In the story of these essayists, as they are called, and the lives of the great English poets and story-tellers of whom we may read in other parts of the book, we learn the story of the greatest of the English writers. In some other parts of this book certain figures appear who would equally have been in place here.

GREAT WRITERS WHO WERE ALSO GREAT THINKERS

Thus, Thomas Carlyle, philosopher and historian, Edmund Burke, philosopher and orator, John Ruskin, one of the leaders of modern thought, and others who may be regarded either as great writers or great thinkers, are to be found on other pages among the thinkers. English literature does not, of course, stop with these men; but it is too early yet to say how many of the later writers with whose work we are familiar to-day will be remembered by future generations.

THE NEXT MEN AND WOMEN BEGIN ON 4789.



Distinguished Visitors Inspecting the Cadet Battalion at West Point.

WEST POINT AND ANNAPOLIS

CONTINUED FROM 4675

YOU have all heard a great deal about generals and admirals and perhaps have read that some of them come from West Point and Annapolis. Possibly you have wondered what these places have to do with soldiers and sailors and have wished to know what and where they are, and what goes on there.

They are two towns, the first in New York, and the second in Maryland, and two famous government schools to train officers for the army and navy are situated in them. The United States Military Academy is at West Point, and the United States Naval Academy is at Annapolis. Few people ever use the whole name in speaking of either of these schools, but use, instead, the name of the town where it is situated, and we shall follow their example, after telling a little about the settlement of West Point itself.

WEST POINT IMPORTANT IN REVOLUTIONARY TIMES

At the beginning of the Revolution, Congress decided to fortify the Hudson River, so that the British could not separate the New England States from the other states. Fifty miles above New York the river breaks through the Highlands in a winding gap, and on the right, or west bank, the land juts out in a point, and from this comes the name. Here Fort Arnold and other fortifications were built. It was these fortifications that Benedict Arnold wished to betray to the British, who could not take them by force. After Arnold's treason the name was changed to Fort Clinton.

When Washington became president, he wished to establish a training school for officers, but little was done. After Jefferson became president, ten cadets of engineers were appointed in 1802, and forty more the next year, but they did not get much attention. Not until 1812 was the school really put on a firm basis. Then two hundred and fifty cadets were appointed.

We cannot tell of all the gallant young graduates who won such glory in the Mexican War. Grant, Lee, Sherman, Hancock, Thomas, Meade, Stonewall Jackson, Albert Sidney Johnston, and Joseph E. Johnston, and many others who later won fame in the Civil War, were all graduates of West Point and served first in the Mexican War, or in the Indian wars.

But we cannot stop to tell more of old West Point as there is so much to

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tell of the new. At the time of the Spanish War, the army was increased and it was seen that West Point must be enlarged. The best of the old buildings were kept, and many new ones were built. They make an imposing appearance as we go up from the river.

Let us see what the school is like. Under the present law there will be, when all are appointed, more than eleven hundred cadets. Two are appointed by each Member of the House of Representatives, two by each Senator, two are appointed from Hawaii, Alaska and Porto Rico, and four from the District of Columbia, and four from the Philippines. The President selects sixty, very often the sons of army or navy officers; twenty are appointed from the graduates of certain military schools, and one hundred and eighty from the regular army and the national guard together. Many of these young men are appointed by competitive examination.

No one can be admitted who is under seventeen or more than twenty-two years of age. He must be at least five feet, four inches tall, when seventeen, and five feet, five inches if older. He must have no disease or deformity, and must be strong and vigorous. His eyes, ears and teeth must be good, and he must not be color blind.

When a young man has received an appointment, he is ordered to report in June. If he passes the examination and is admitted, he becomes a "plebe." All summer he is drilled, first while living in the barracks and then in summer camp in tents. In September, all the cadets move back to the barracks, and regular recitations begin. The course lasts four years and is very hard. There is a great deal of mathematics, besides physics, engineering, science, French and Spanish, law, English and history and drawing. The cadet must study drill regulations, ordnance and gunnery, and other things which a soldier must know. He must go to the gymnasium, and must learn to swim and to ride. Every day is full of its duties, and yet no students have a better time than the West Point cadets.

The cost is all paid by the government. Every year $746 is credited to the young man, and the cost of everything he eats, wears and uses is charged to him. The cadets all eat together in the Mess Hall. At the end of two years, if his record is clear, a cadet has a vacation, or "furlough," for the summer, and may visit his home. The other summers are spent in camp, where there are no lessons from books, but much drill, riding and practical work in engineering is done during the summer encampment.

Everything is done under strict military discipline. Cadets always wear uniform, and march to the door of the recitation room, under charge of one of their number. In the room, the instructor, usually an army officer, has charge. Sections are small, never more than fifteen, and a student is called upon to recite nearly every day. No excuses are accepted for poor recitations, and marks are posted every week. A student is expected to spend about two hours in preparing his lesson in a hard subject, and if he fails in one of these subjects, he is either dropped from the Academy, or is turned back to the next class, losing a whole year.

Misconduct of any sort is not permitted. If a young man is not respectful to his officers, is late, or does not keep his uniform, his gun, or his room clean, he is punished by being given extra duty, or by loss of privilege. If he is reported too often, he is suspended or dismissed.

So his life goes on through the four years. He learns many things. The cadets do everything that the regular army men do, and they are commanded by cadet officers. These officers are much envied, as they are chosen from the cadets of highest standing. The cadet is taught that no man is fit to command who has not learned to obey. He is taught how to study, and he gains an almost perfect body.

Then when he finally gets his diploma, he is commissioned a second lieutenant in the United States Army, and begins his work as a leader of men. Those who have the highest record for studies, and conduct, are allowed to choose the branch of the service they prefer, as engineers, artillery, cavalry or infantry. The men of highest rank usually choose the engineers, but not always. Wherever they go their standing in class helps them, for the men of high rank are promoted first.

WHERE THE OFFICERS OF THE NAVY ARE TRAINED

A hundred years ago boys who wished to become naval officers got appointments as midshipmen, if they could, and were

sent aboard one or another of the war vessels to carry messages for the officers. They were only boys, and no one looked after them very much unless they got into mischief. Then they were severely punished. Under these conditions a few became good sailors and officers, but the thoughtless and careless did not learn much.

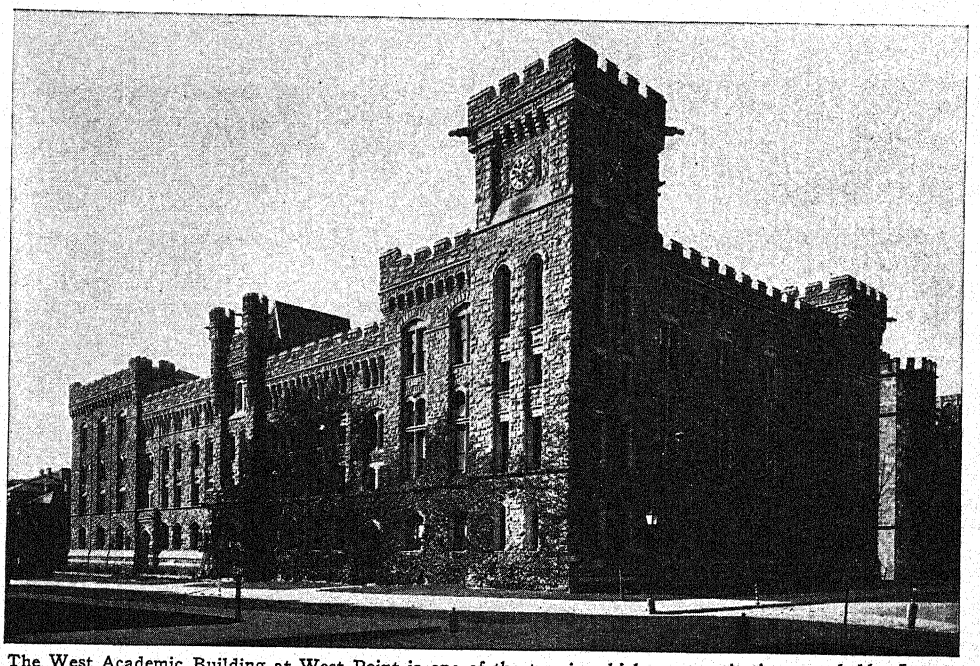
Later, several schoolmasters were appointed to the ships, but sometimes the captains did not help, and there were many interruptions to the teaching. Some of the officers favored a real naval school, and Matthew F. Maury, a distinguished officer, wrote so much upon the subject that he has been called the "Father of the Naval Academy." Finally the famous historian, George Bancroft, became Secretary of the Navy, and he determined to found a school to train officers.

Congress had not given any money for this purpose, but there was an abandoned fort at Annapolis, Maryland. The War Department turned over Fort Severn and nine acres of land to the Navy Department, and here, in October, 1845, the Naval School was opened with three instructors and fifty midshipmen. The course of study was to be five years, of which the first and fifth were to be spent at school and the other three on board ship. The name was changed to the United States Naval Academy in 1850, and the time spent at school became four years. Soon the old Constitution was given as a training ship.

At the beginning of the Civil War, it was feared that Annapolis was too far south to be safe, and the school was moved to Newport, Rhode Island, in 1861, and did not return to Annapolis until 1865.

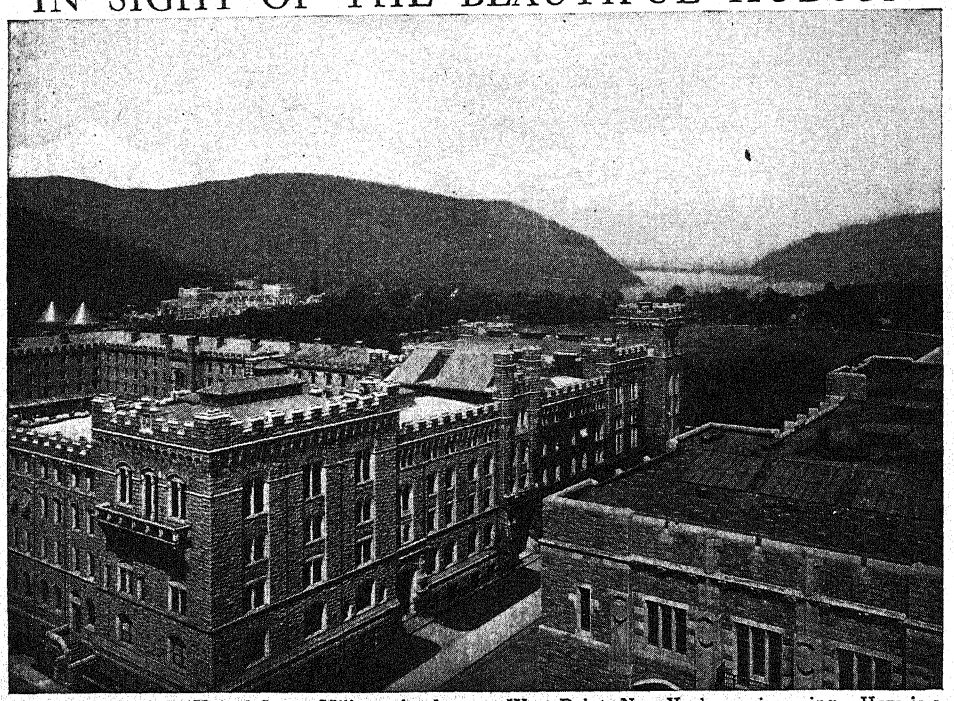
After the Civil War the Navy of the United States was neglected, and little attention was paid to the Academy. There was not room for all the graduates, and they were encouraged to resign. When greater interest was taken in the navy, and many new vessels were built, more officers were needed, and after the Spanish War, magnificent new buildings were constructed. Now the Academy has better buildings than any other naval school in the world.

Much land has been bought since 1865, and the grounds are quite extensive. The principal buildings are all new. The largest is Bancroft Hall, where the midshipmen live, and on one side is Luce Hall, used as a gymnasium, and on the

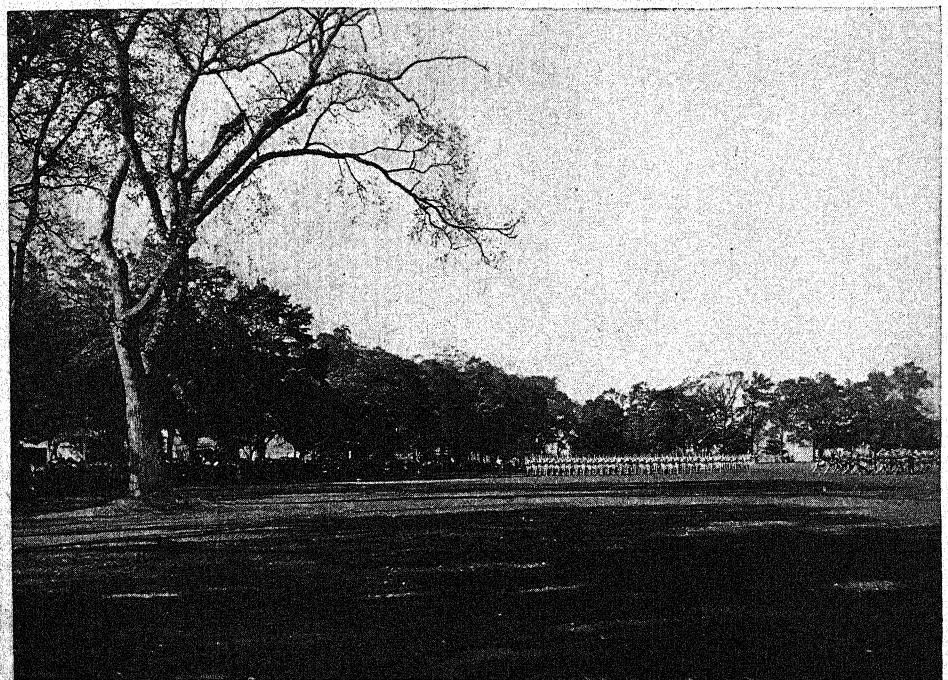


The West Academic Building at West Point is one of the two in which most recitations are held. It was built in 1895, and is a successful example of fitting a new building into old surroundings. The East Academic is just opposite.

IN SIGHT OF THE BEAUTIFUL HUDSON



The buildings of the United States Military Academy at West Point, New York, are imposing. Here is a view of a small part of them, taken from the roof of another building. The river beyond is the Hudson, at the point where it breaks through a gap in the Highlands. Since 1902, many new buildings have been erected, making room for many more cadets than formerly. The views around the Academy are superb.

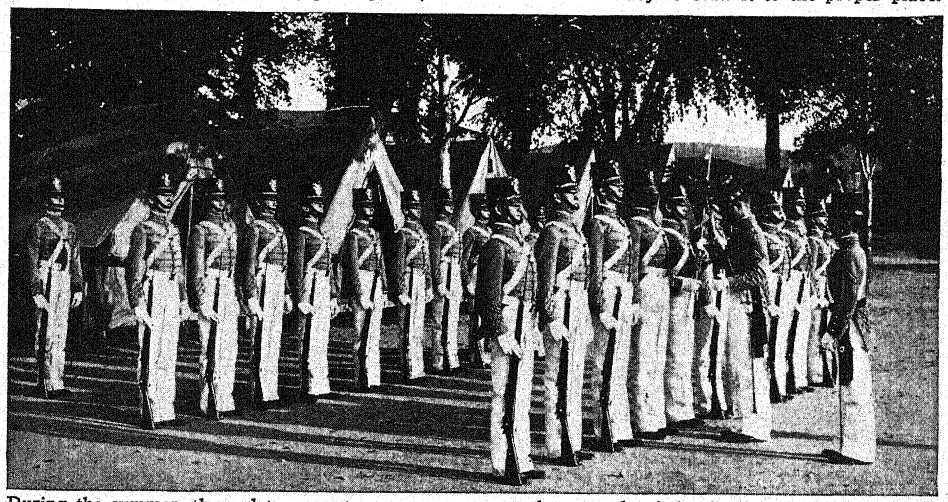


The reservation around the Academy, including Constitution Island in the river, which also belongs to the United States, amounts to about five and a half square miles. The parade ground is large enough for the exercise of a considerable body of troops. Here we see the cadets on parade, watched by many interested spectators. The cadets are famous for the accuracy and precision with which they go through the drill.

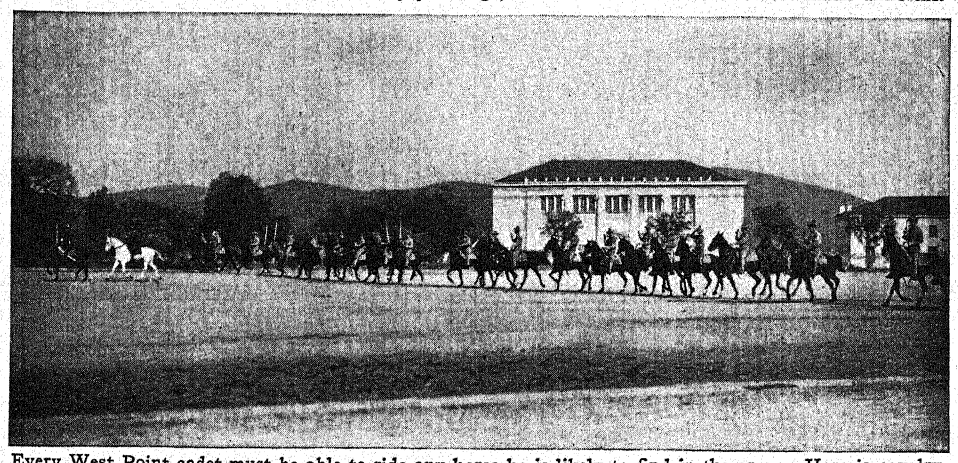
SUMMER WORK AT WEST POINT



Cadets at West Point are drilled as infantry, artillery and cavalry. Here you see a group engaged as light artillery. The gun is being put together, and the horses are ready to draw it to the proper place.

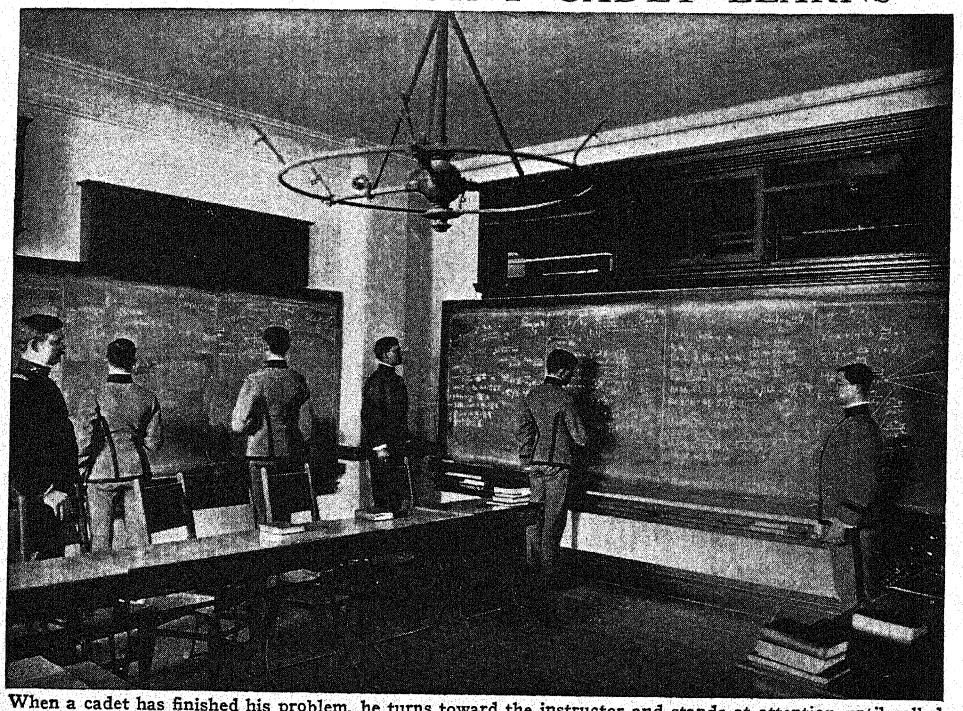


During the summer, the cadets move to summer camp on the grounds of the Academy, where they live in tents. Here "inspection" is going on. The cadet officer is examining the guns and equipment, seeking to find a speck of dirt. The cadets here are in the dress summer uniform, worn only on special occasions. Such caps and coats were worn by the army years ago, but have been discarded for the khaki uniforms.

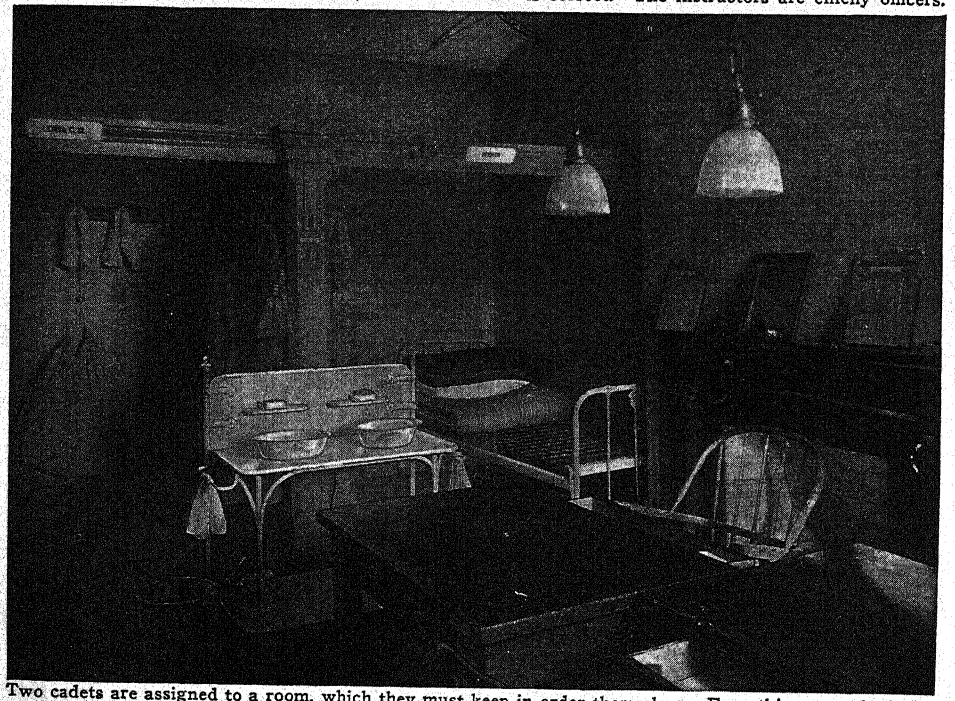


Every West Point cadet must be able to ride any horse he is likely to find in the army. Here is cavalry drill on the ample grounds of the Academy. Lessons in riding are given indoors in the great riding hall.

HOW A WEST POINT CADET LEARNS

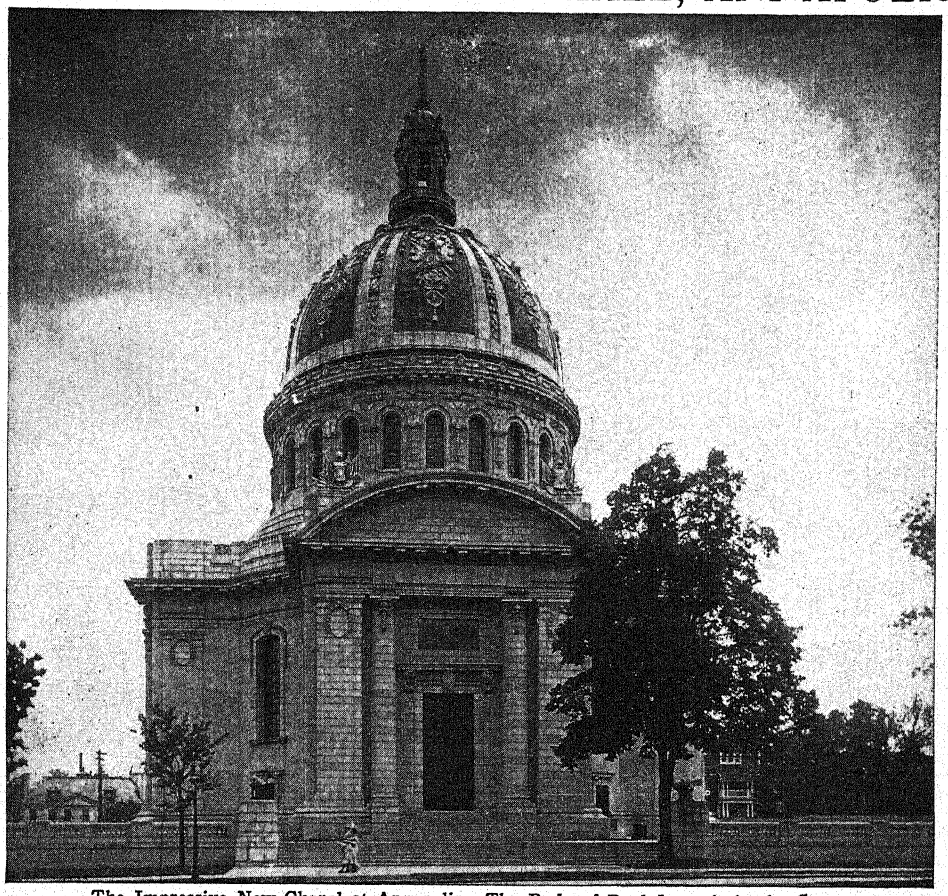


When a cadet has finished his problem, he turns toward the instructor and stands at attention until called upon to recite. Then he turns to the blackboard and explains his work. If his work is correct and his explanation full and clear he receives a high mark, but if the instructor must ask a question to make the explanation clear, a deduction is made, even if the work is correct. The instructors are chiefly officers.

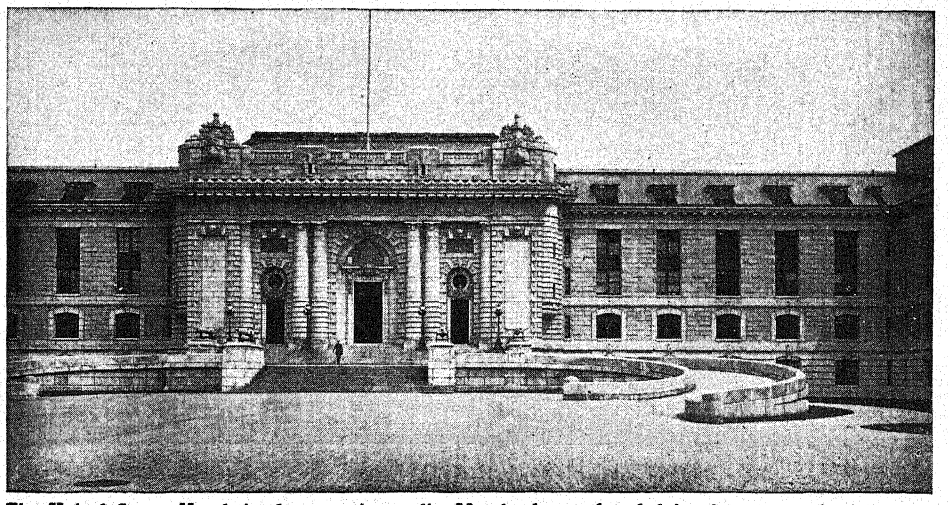


Two cadets are assigned to a room, which they must keep in order themselves. Everything must be in its proper place, and neither must use the other's things. The beds must be left exactly as the rule requires. The regulations fix exactly the place where towels, soiled clothes, and even whisk-brooms must be kept. No litter is allowed, and each cadet must post his schedule showing where he may be found at any hour.

CHAPEL AND BANCROFT HALL, ANNAPOLIS



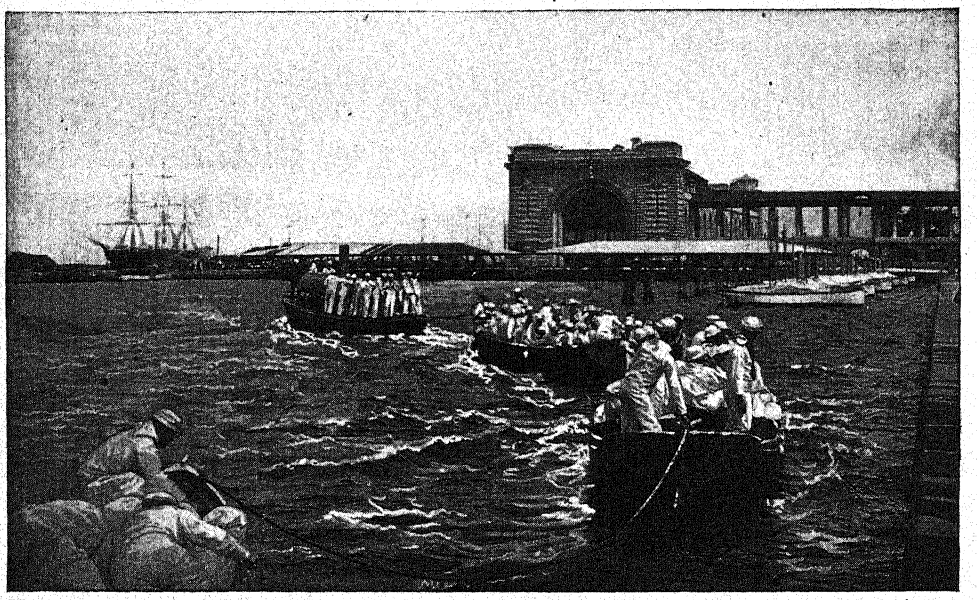
The Impressive New Chapel at Annapolis. The Body of Paul Jones is in the Crypt.



The United States Naval Academy at Annapolis, Maryland, was founded in 1845, as a school to train naval officers, and received its present name in 1849. Since about 1900, many new buildings have been constructed, and now it is the most complete naval school in the world. This is only a part of Bancroft Hall, the immense building used as a dormitory for the midshipmen. The building was named in honor of George Bancroft, the historian, who was Secretary of the Navy when the Academy was organized.

other is Dahlgren Hall, the armory. Behind Bancroft Hall is the Academic Group, which consists of Mahan Hall, Maury Hall, and Sampson Hall. All are named for distinguished officers. Isherwood Hall is behind these, and the Chapel, and the officers' residences are to the south.

The midshipmen are appointed very much like the cadets at West Point. Each Senator and Member of the House of Representatives is allowed to appoint three, and as one is graduated, resigns or is dropped, he may fill his place. Two are allowed to the District of Columbia, one to Porto Rico and one to the Philippines.



Much attention is given to the use of boats, large and small, and the Academy owns many. The midshipmen are here being towed out to a ship to start on the summer cruise, as you can guess from the baggage. The building is Luce Hall, and is used as a gymnasium. The water is called the Dewey Basin.

The President may appoint fifteen each year, and twenty-five each year may be appointed from the Navy or the Marine Corps.

The newly appointed midshipman may take his examinations for entrance at many places throughout the country. If he passes he reports at Annapolis in June for his physical examination. This examination is even more strict than the examination for West Point. If he is admitted he also becomes a "plebe" and the summer is spent in drill, in gunnery, gymnastics and in the use and management of boats.

Regular work begins in the fall. The course, like that at West Point, is four years. It requires a great deal of mathematics and physics, for a modern battleship is a complicated mass of machinery. The midshipman must also study English, history, and Spanish or French.

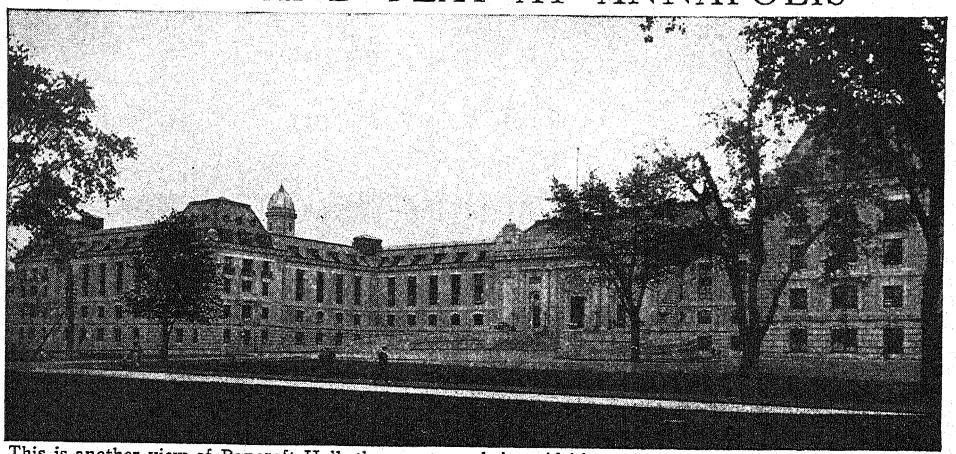
The discipline is much like that at West Point, very strict, but fair, and the midshipmen have a good time. They drill also, but their uniforms are blue, instead of gray as they are at West Point. Every summer all classes go for three months on a practice cruise on warships, and then have a month's leave, during which they may visit their homes.

When the midshipmen are graduated they are commissioned ensigns in the United States Navy, or officers in the Marine Corps, and assigned to duty wherever they are needed. As in the army, high rank at Annapolis helps to gain earlier promotion in the navy, and the higher men may be lieutenants while the lower men are still ensigns.

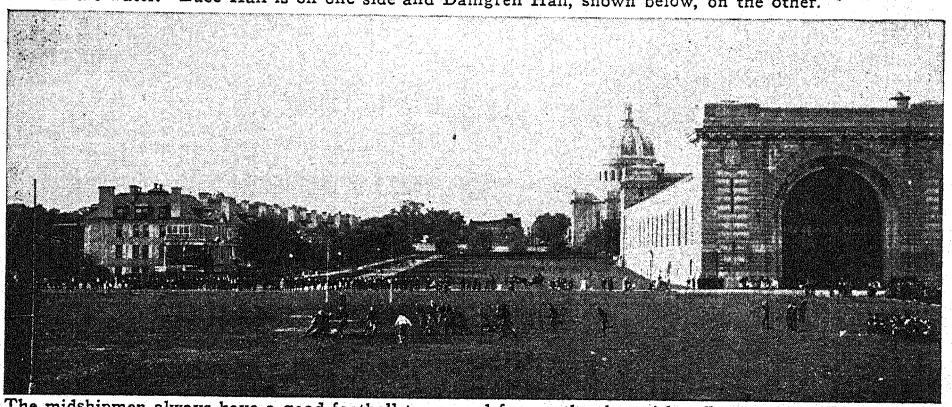
Such are the two great schools to train American officers. They are open to any American boy who can get an appointment, and generally the Members of Congress hold examinations, and give the appointments to those who stand highest. When they enter the schools it does not matter whether their fathers are rich or poor, distinguished or unknown.

THE NEXT STORY OF THE UNITED STATES IS ON PAGE 4765.

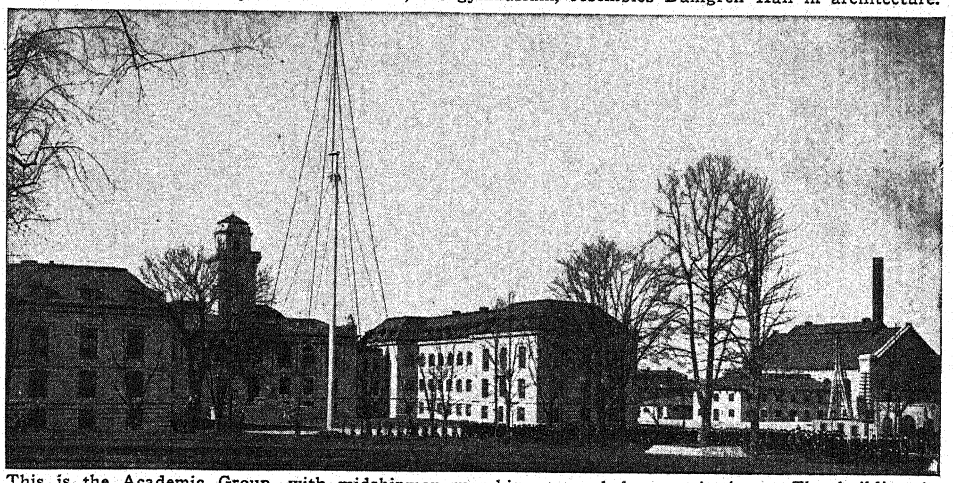
WORK AND PLAY AT ANNAPOLIS



This is another view of Bancroft Hall, the quarters of the midshipmen, taken in the summer while all of the midshipmen, except the fourth or entering class, were away on the annual practice cruise. It looks out on the water. Luce Hall is on one side and Dahlgren Hall, shown below, on the other.



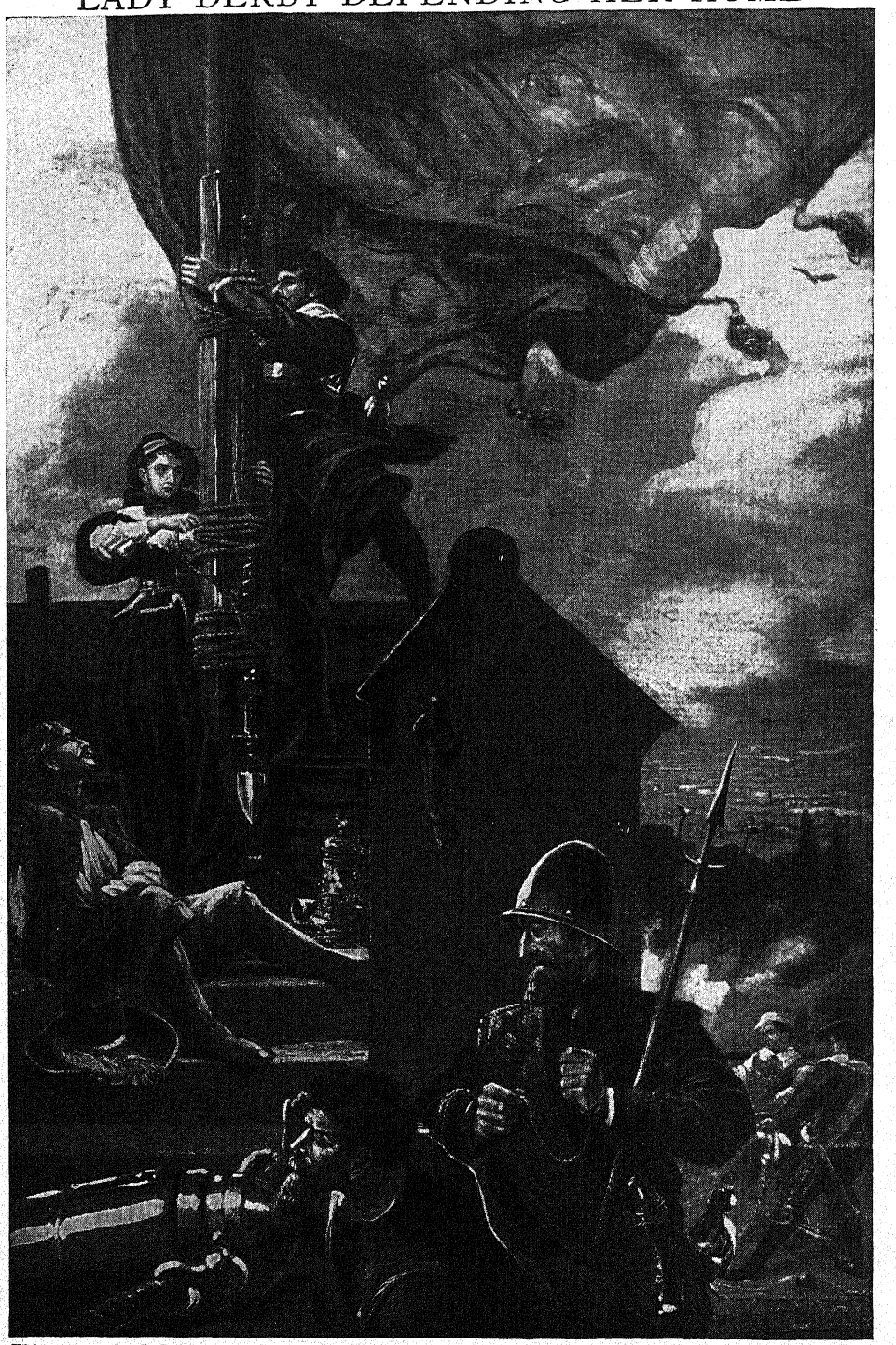
The midshipmen always have a good football team, and frequently play with college teams. The building on the right is Dahlgren Hall, and beyond is the Chapel. On the left is Porter Road, where many officers who teach in the Academy live. Luce Hall, the gymnasium, resembles Dahlgren Hall in architecture.



This is the Academic Group, with midshipmen marching to and from recitations. The building in the centre is Mahan Hall. Maury Hall is to the right, and the building on the left is Sampson Hall. Here are most of the recitation rooms, though some special subjects are taught in other buildings. Dewey Basin, where the ships lie, is to the right of the picture, near the Power House.

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LADY DERBY DEFENDING HER HOME



This picture by G. D. Leslie, R.A., illustrates a striking incident in the gallant defence of Lathom House by Charlotte, Lady Derby, as told on page 4746. When the army of the Parliament laid siege to her castle in the absence of her husband, and summoned her to surrender, Lady Derby indignantly refused, and resisted the besieging forces. Here we see her helping to lash the Royalist banner to the flagstaff on her castle.



A KING WHO LOVED THE POOR

CONTINUED FROM 4663

THERE is no greater hero in all Spanish history than Ferdinand III., King of Castile and Leon, who began to reign in the year 1217. He did much to increase the power and prestige of his kingdom, and it was by his skill and energy that the Christians began to drive the Moors out of Western Europe, where they had held power and sway so long.

Ferdinand was a man well in advance of his time, and in no sphere was this better shown than in war. Instead of killing or robbing the people in the towns that he captured, he allowed them to depart freely with as much of their goods as they could carry. Of course, sometimes he took prisoners, and when in 1236 he captured Cordova, the great seat of the Mohammedan power in Spain, and found the bells of a Christian church being used as lamps in the mosque, he had them carried back on the shoulders of his Moslem prisoners to the church from which they were taken. The bells had originally been conveyed to the mosque by Christian prisoners of the Moors.

Like most great and good men, Ferdinand owed much to his mother, Queen Berengaria, of whom it has been written that she was one of those rare beings who seem to have been born to do right and to have done it. She was an ennobling influence in the life of Ferdinand from his youth up, and made him the pious and sympathetic man he became in spite of evil circumstances all around. Her name is associated only with what is good and worthy and noble in an age of violence and wrong and robbery.

Not only his military prowess, but his justice and love of truth caused Ferdinand to be loved by all his people, and to gain the admiration even of his enemies. While respecting the rights of the rich, he would not allow violence of any kind to be shown to the poor.

He would never make war upon a Christian prince or nation, and only fought the Moors because in the ignorant age in which he lived this was thought to be a holy duty imposed upon every Christian prince.

His love for the poor among his people was shown in many ways, and he was not content to direct from his throne that they should be considered and cared for. He made it a practice to attend to their needs himself, and such scenes as that shown in the picture on this page were by no means uncommon, when the king, dressed in his royal robes, waited upon the beggars, who were given a feast at their sovereign's

expense. This would be conduct worthy of the highest praise in a monarch to-day; but when we remember the cruel and barbarous and selfish age in which Ferdinand lived, it is indeed a striking instance of how a man may be a real hero, and do truly golden deeds in quite another sphere than that of war. Ferdinand, for his kindness to all around him, well merits the rank and honor of Saint, a title, however, that the Church bestowed upon him less for his gracious acts of kindly sympathy than for his austere religious life and his continued and persistent attempts to convert the Moors to Christianity.

THE GALLANT DEFENCE OF LATHOM HOUSE

ONE of the brightest episodes in the English Civil War was the gallant defence of her castle home by a woman. James, Lord Derby had marched to join King Charles, leaving his wife, Charlotte, the beautiful daughter of Claude de la Trémouille, a French nobleman, in Lathom House with a guard of but 300 men and servants, little thinking that the forces of the Parliament would come that way. But Lathom House, in Lancashire, was fortified with a wall two yards thick, strengthened by nine towers, each of which contained six pieces of cannon, and with a palisade and moat within. The Parliamentary army accordingly determined to capture it, and threw up earthworks some 200 yards away from the walls. On February 27, 1644, came General Sir Thomas Fairfax, to take charge of the siege. The next day he sent a messenger to Lady Derby, saying:



Charlotte, Lady Derby.
See also picture on page 4744.

"The Parliament sends you this ordinance, requiring of you that you do yield up Lathom House upon honorable conditions, and they declare that their mercy shall be shown to your husband if he will submit to their authority."

"Greatly surprised indeed am I," replied the countess, with spirit, "that Sir Thomas Fairfax should require me to give up my lord's house, since no offence against the Parliament had been committed. Go, tell Sir Thomas that I desire a week's truce wherein to consider this demand."

Fairfax realized that this was but a ruse to gain time, and sent back word refusing this request, and inviting her to come to Lord Derby's other house in New Park, saying:

"I will take you there myself in my own coach, and, when there, my colonels and I will discuss with you."

Lady Derby promptly refused, saying:

"My birth, my sex, and the honor of my lord demand that you should come to me, and not I to you."

The siege went forward. Lady Derby lashed the Royalist banner to the Eagle Tower, the keep of her castle, and conducted the defence with energy and a calm courage. She sent out successful sallies, which effected captures of both arms and prisoners, with but very little loss. All that April cannon and mortar rained chain-shot, stones, and bars of iron upon walls and towers, but with little effect. On one occasion a shot thrown by a large mortar fell into the room where Lady Derby was dining with her children and officers. The heroine rose from the table, found that no one was injured, and instantly ordered another sally. Rigby, Fairfax's successor, sent in another letter demanding surrender. Lady Derby tore it in pieces, and, summoning the messenger before her, exclaimed:

"Your reward for this work should be that I should hang you at my gate, but you are only the foolish instrument of a traitor's pride. Tell the insolent rebel, Rigby, that he shall have neither persons, goods, nor house of mine. When we are spent, we shall find a fire more merciful than he is; and then my goods and my house shall burn in his sight, and we all will seal our religion and loyalty in the flames together rather than fall into his hands."

The soldiers present shouted:

"We are willing to die for your honor and his Majesty the King!"

On May 25 word was brought that Prince Rupert was marching to relieve her. The besiegers soon heard of this, and on May 27 raised the siege.

THE NEXT GOLDEN DEEDS ARE ON PAGE 4799.

THE STORY OF OUR MINDS

WE come now, in our story of our own life, to the most interesting and wonderful thing in the world. We have read the story of our bodies, the parts of us that we see, and know, and feel. But our body is a servant, and we are now to read of its master. We take up a pen to write, but the hand acts at the bidding of its master, the mind. What is the mind? Not all the wisest men who have ever lived have been able to understand the mind of a little child. It is the mind that knows whatever we know, yet we know less about the mind itself than about anything the mind knows. One thing about the mind we know—that without it we should know nothing.

THE MASTER OF THE BODY

CONTINUED FROM 4637



THE first great fact about the mind is that here is something which is real, and yet which cannot be taken hold of. It is not a part of the body. Any part of the body, even the nerves or the highest part of the brain itself, can be seen, touched, or cut. The body is a material thing, as material as a hard, solid rock or a piece of earth.

Now, if we take a rock and weigh it, examine it chemically, and in all the other ways in which a material thing can be examined, we learn all there is to learn about the rock. But we know very well that, if our bodies were to be examined, as a rock is examined, there would be a tremendously important fact about them missed altogether—the fact of sensation, which does not exist in the case of the rock.

The things we are likely to believe in most are things we can see and handle, and it requires an effort of the mind to realize that there are great realities in the world which cannot be seen and handled, and are utterly different from anything in the world that can be seen or handled. Such a reality is the vision of this page, as we read at this moment. The eye and the brain are not sight; they are its organs or instruments; sight is something else. The eye and the brain might be examined for a thousand years under the microscope, in test-tubes; but, whatever else we found, we should never find *sight* there, because we have now left the realm of the physical world, made up of matter and ether and motion, and we have entered another realm, which is the world of mind. The greatest of all follies is to believe that the real world is the world of matter and ether and motion, and that, somehow or other, sensation and feeling and thought and will are not real, but imaginary things that grow out of matter and have no meaning. That is the doctrine of materialism, and it is a stage that many people's minds pass through when they begin to think; but if they go on thinking, they always, sooner or later, pass beyond it.

Therefore, we must understand that when we study sensation we are studying something which is more important, more wonderful, and more real than anything we have studied yet, either in the Story of the Earth or in the Story of Our Own Life. Indeed, we have only to think for a moment to see that everything we know, or think we know, about the outer world and about our own bodies, is known to us through our senses.

If they are not real, and if they are not trustworthy, we know nothing that we think we know, nor can we ever know anything. More than this, the truth is that we know nothing at all but our sensations. Everything we suppose as to the outside world is an argument based on the

knowledge that we have gained through our senses. It is only, indeed, an argument on our part that other people feel as we do. We can never get outside our own minds, and we can never get into the mind of anyone else. Our senses tell us that other people act as we do, and so we suppose that they feel and think as we do, though we can never feel their feelings.

We have already seen that the senses are of many different kinds. There is an important group of them which merely tell us about our own bodies, and another group which tell us about the outside world. For a long time it was supposed that our minds, our beliefs about things, our feelings, and our will depended entirely upon the senses that have to do with the outside world, such as sight and hearing. It is one of the great discoveries of recent years that the senses which have to do with our own bodies play a great part of their own in the training of the mind, and in the daily lives of our minds.

THE INVISIBLE THINGS UPON WHICH HUMAN HAPPINESS LARGELY DEPENDS

Feelings of hunger and thirst, feelings derived from the movement of the heart and the lungs and the organs of digestion, feelings from the joints and the muscles, all enter into our minds. In very great measure our happiness or unhappiness depends upon the quality of the feelings that come into our minds from our bodies as well as upon our outside surroundings. Compare an unhappy millionaire suffering from indigestion and a healthy street boy in the rain.

Perhaps the greatest importance of the study of the body lies in the fact that it is beginning to teach us how to help human happiness, which depends far less than we suppose on things outside, and far more upon invisible things which get at our minds from within.

These sensations from the body all have the common fact about them that they are vague and not well defined. There is a great contrast between these vague feelings and a precise, sharp, definite sensation, such as we get from the eye or the ear, and that contrast exists, as a rule, between sensations from within and sensations from without. Now let us suppose that it were possible for a human being to grow up without getting any sensations, whether from within or from without. What sort of person would he be? What sort of a mind would he have? What would he think about? What would he know? When we place before ourselves questions like these, we see the answer at once.

A MAN WHO COULD KNOW NOTHING AND THINK NOTHING

Such a person would have no mind; he would be merely a body, like a cabbage—humbler, indeed, for even a cabbage has some sensations. A man of this kind could know nothing and think nothing. That, then, is what we mean when we say that the mind is built upon sensation. The senses are not merely the gateways of knowledge, but if they let nothing in, the mind itself, which knows, could not develop.

All this great question was ably worked out by an immortal Englishman, John Locke, more than two hundred years ago. Very little was known at that time about the eye and the ear; still less was known about the sense of balance and the other internal senses. But that did not prevent Locke from taking up the question in general, and placing it upon a firm basis for all time.

He came to the conclusion that nothing is in the mind that was not first in the senses, and that the whole of our knowledge and ideas and beliefs depend upon two things, and two things only. These things are sensation, in the first place, and, in the second place, reflection upon what the senses tell us.

Now, all this is not merely a matter that has no practical meaning. It is impossible to name any beliefs which are of greater practical importance than these. Their real meaning for our lives, and for the lives of all the children who are to come, is that they give us the key to real education. If the mind is built upon the senses, then assuredly, if we want the best possible mind, we must do our best for the senses. The real difference between a high kind of person and a low kind of person depends, in the beginning, upon their senses.

HOW THE EDUCATION OF A CHILD SHOULD BEGIN

The question, as we have seen, is not one of mere keenness, but it is a question of delicacy of sensation—the power to distinguish between one sensation and another, the power to remember and recognize them, and the power to associate

them together in our minds. All real education of the mind, then, must begin by recognizing that the mind is built upon the senses, and depends upon them for its operations.

This means that we shall begin to care little about teaching facts and ideas, arithmetic, language, and such things, to small children, and that we shall begin by saying to ourselves that our first duty is to the child's senses. These are the avenues of knowledge, and the mind is taught by them. It is therefore wicked folly to attempt to teach a child history or geography when it is half deaf for lack of attention to its throat and nose and ears, or half blind for lack of spectacles that are suited to its eyes.

Our very first duty is to see from beginning to end that all the senses of the child are as well as can be. When we have the child before us with healthy senses, our next business is to train it; it must be taught to see differences between things; it must learn to appreciate beauty of color and form.

THE THINGS UPON WHICH A CHILD'S MIND SHOULD BE BUILT

We must take great care that the child sees beautiful things, and if things of ugly shape and ugly color are shown to it, it must be taught to see that they are ugly. If we provide it with pictures, plain or colored, they must be simple and beautiful. There is no more reason why we should expose a child to ugly sights than to ugly smells. We must do the same as regards the child's ears; it must learn to know the difference between a beautiful voice and an ugly one, both in speaking and singing.

Children should be trained to recognize the tone of different musical instruments, and to know when a piano is in or out of tune. They should learn to recognize the notes of birds and the other sounds of Nature. If a child were well trained in all these matters—and in many more that might be named—but not in any book knowledge, people might very likely say that the child was ignorant and had been neglected; but such a child, especially if its brain is being taken care of by plenty of sleep and fresh air, is certain, in after years, to outstrip children less wisely brought up. Such a child will be happier and healthier, and when he or she is in the early or late teens, and begins to do a good deal of book-work, will learn more quickly, more thoroughly, and will remember better than other children. The foundations of that child's mind have been rightly and solidly laid.

THE CHILD WHO GREW IN SUN AND SHOWER

These great truths have never been more perfectly expressed than in Wordsworth's noble poem, beginning, "Three years she grew in sun and shower," which we read in another part of this book. In it he describes his ideas of the education of a girl. She was to be educated by the clouds and the willow-trees, and by the motions of the storm:

> The stars of midnight shall be dear
> To her; and she shall lean her ear
> In many a secret place,
> Where rivulets dance their wayward round,
> And beauty born of murmuring sound
> Shall pass into her face.

In his boyhood this great poet was educated by the company of his sister. She loved him greatly, and devoted her whole life to him. She herself had noble and beautiful ideas, which she often gave as suggestions to the brother whose happiness was of more importance to her than anything in the world. So they lived peacefully together, and this, he tells us, is what he owed to her:

> The blessing of my later years
> Was with me when a boy;
> She gave me eyes, she gave me ears,
> And humble cares, and delicate fears;
> A heart, the fountain of sweet tears;
> And love, and thought, and joy.

As a rule, when we talk of mind, we usually mean just the part of the mind that thinks and knows. In other words, we are too apt to suppose that really the whole of the mind is made by the intelligence or the intellect.

THE NEW STUDY OF THE MIND THAT BEGINS AT THE BEGINNING

We think that the mind is the part of us which knows, and are far too apt to leave out of account the part of us which feels and desires and does. It is no doubt true that the part of the mind which most distinguishes us from other creatures is the knowing part of the mind, and that is a great reason for attaching special importance to it and giving it our utmost study.

But it was not until men began to study other parts of the mind that the key to the great question of human conduct began to become clear. This

great stage in the history of our knowledge was begun by the work of Herbert Spencer in 1855, and a great scientist afterwards declared that on this foundation, so well laid, there would be raised a new study of the mind.

Up to Spencer's time most English students had simply studied the intellect. But Spencer saw that they were making the great mistake of not beginning at the beginning. He declared that if we are to study the mind of the highest type of man when he is grown up, and more especially if we are at all to understand not only his ways of thinking, but his ways of doing, we must really try to begin at the beginning. We must study the mind in all its forms; we must study the minds of women as well as men; we must study the minds of children. Other races of mankind have differences in their minds; we must learn the ways of uneducated people and of savages as well as of educated people. We must even learn all we can of the senses, instincts, habits, and doings of the lower animals.

THE IMPORTANCE OF STUDYING THE WHOLE MIND AND NOT MERELY A PART

We know that Genesis, the name of the first book of the Bible, means "the bringing forth." So this study of the mind—which tries to go back to the beginnings to see how our minds are made and have been brought forth—is called the *genetic* study of the mind, and all our modern methods of studying the mind and coming to understand it are more or less based upon this new way of looking at it.

One great result in the last half-century of work on this subject has been to remind us of the importance of many parts of the mind which are not the intellect at all. The study which took no notice of habit and of feeling and instinct, which really took no notice of anything except the way in which we get ideas and the way in which we reason about them, was not the whole study of the mind, and was probably not even the most important part of it. Nay, more; even that could not be successfully studied and understood if the rest of the mind was forgotten. How, for instance, if we forgot all the rest of the mind, should we be able to learn the way in which our ideas and beliefs and judgments of things and of people are so often affected or, indeed, quite decided by our feelings?

But now that we are sure not to make the great mistake of supposing that the knowing and reasoning part of the mind is the whole of the mind, and that feeling is not quite as important as thinking, we may go on to study what becomes of these sensations of ours, and how the intelligence and the intellect are built up out of them.

HOW WE MAY SEE A THING AND YET NOT SEE IT

Such a thing as a flash of light or a sudden sound will produce certain results in us, perhaps, but we cannot be said to think; we simply "sense." Now let us suppose that a little more time is given to us, and that instead of a mere flash of light, there is light coming from something that has parts and a shape—say, from a tree. Suppose that we see this tree very indistinctly from a great distance or in half-darkness, and that we do not expect to see a tree in that place. At first, as we say, we see it, but we do not see what it is.

We have all noticed this in a thousand cases. Sometimes in a picture or a photograph we cannot make out what is there. It is not that we are blind; we are seeing, or "sensing," perfectly, but we have not put together the lines and forms and lights and shadows so as to make a whole of them.

Now, this is the next great stage in the building up of the mind. The stage of mere seeing yields to the stage of perceiving. The first stage was *sensation* and the second stage is *perception*, and the difference between them is tremendous, because though mere sensation, as of light, may have definite effects in causing us to move to or from the light, yet if seeing never went on to perceiving, intelligence could never possibly be formed.

THE DIFFERENCE BETWEEN SEEING A THING AND PERCEIVING IT

We ought to think of this and notice for ourselves. The interesting thing about the study of the mind is, that we always have material at hand to study—our own minds and the minds of other people. Now, when we think of the difference between mere seeing and perceiving, we discover how very important the memory is to all of us.

THE NEXT PART OF THIS IS ON PAGE 4855.

A FAMOUS FRENCH STORY

LUDOVIC HALÉVY, who was born in Paris on January 1, 1834, and died on May 9, 1908, was a celebrated author of plays and operas. He had only written two or three stories when, in 1882, he published "The Abbé Constantin," which won for him wider and enduring fame. In those days the popular literature of the Parisians stood in need of being made more wholesome. So Halévy wrote this beautifully fresh and pure story. It was a return to simplicity and the admiration of honest, healthy people. We American readers have to remember, of course, that it is a story of life unlike ours, but we must always admire goodness and charity in all people, no matter what may be their peculiar customs. The custom, in addressing a French vicar, is to call him "Monsieur le Curé," which literally means "Mr. the Vicar," but as it cannot be given in an English equivalent, the French phrase is retained in this little version of the original story.

THE ABBÉ CONSTANTIN

CONTINUED FROM 4646

WITH footstep firm and strong, despite his weight of years, a venerable village priest was walking along a dusty country road one sunny day in May, 1881. It was more than thirty years since the Abbé Constantin had first become vicar of the little village sleeping there in the sunny plain of France, beside a beautiful little river called the Lizotte. The village was one that had grown up under the shadow of the historic castle of Longueval, and had always looked to the castle for the chief interest of its life. Throughout the Abbé Constantin's long and serene days as the spiritual guide of this little village, he had experienced much happiness in his relations with the owner of the castle. For many years he had dined there every Thursday and every Sunday. He was a good and gentle soul, and the old marchioness had loved to see him at her friendly table, where he was as much at home as in the houses of his poorest parishioners.

But, alas! these days were no more, and now he stood outside the castle gates gazing sadly at two immense announcements printed on blue paper and pasted on the pillars. The castle was for sale. For the old marchioness had recently passed away, and as her only son had died eight years before, her estate was inherited by three grandchildren, two of whom were under age, so that the whole had to be sold by the trustees. Her grandson Peter was a foolish young man, given to extravagance, and there was no chance of his being able to repurchase the castle. The good abbé was sad at heart, to think that it might pass into the hands of someone who would not take the kindly interest the late owner had always shown in the welfare of the villagers. When he thought of how the altar of his little church used to be beautified in the month of May with sweet flowers from the conservatories of the castle, and how bare it was this year, he felt that the good work of his little church had indeed lost an invaluable as well as a much-loved friend.

As he stood there reading the advertizements of the sale, which announced that the property would first be offered in four lots: (1) the castle with all its beautiful grounds and far-stretching parks; (2) the farm of White Crown, some 700 acres in extent; (3) the farm of Rozeraie, 500 acres; and (4) the woods and forest, extending to some 900 acres—these were first to be bid for separately, and then the whole property was to be offered if a purchaser could be found to take over the entire estate—the abbé had little hope that anyone would buy all the lands of Longueval, and

it grieved him to think that this splendid estate might now be split up among different owners. Resuming his walk along the highway, and still in pensive mood, he was passing the park of Lavardens when he heard someone calling him. Looking up, he saw the Countess of Lavardens and her son Paul. She was a widow. Her son was a handsome young man who had made a bad start in the world and now contented himself by spending some months in Paris every year, when he dissipated the annual allowance from his mother, and returned home for the rest of the year to loaf about in idleness or in pursuit of stupid sports.

THE DAY OF THE SALE OF HISTORIC LONGUEVAL CASTLE

"Where are you off to, Monsieur le Curé?" asked the countess.

"As far as Souvigny, to learn the result of the sale," he replied.

"You will know that soon enough if you stay here with us on the terrace, for our neighbor, M. de Larnac, is there, and will hasten back with the news. And, what is more, I can tell you who are the new owners of the castle."

At this the abbé turned into the gates of the countess's place, and joined that lady and her son on the terrace of their house. The new owners, it appeared, were to be M. de Larnac, M. Gallard, a rich Paris banker, and the countess herself, for the three had agreed to purchase it between them.

"It is all settled," the lady assured him; but presently M. de Larnac arrived with the news that they had been unable to buy it, as some American had paid an enormous sum for the entire estate. The person who was now to be the great lady of Longueval was named Mrs. Scott. At the announcement of the name, Paul made an exclamation of surprise.

WHY THE ABBÉ CONSTANTIN WAS SAD AT THE SALE OF THE CASTLE

It appeared he had been at a ball in Mrs. Scott's house in Paris the previous week, and he voted her a charming lady, although she had only newly acquired her wealth, and was making a great show in Paris. M. de Larnac had some further particulars to add. He had heard that the Scotts were great upstarts, and that the new owner of the castle had actually been a beggar in New York. A great lawsuit had resulted in favor of her and her husband, making them the owners of a silver-mine.

"And we are to have such people for neighbors!" exclaimed the countess. "An adventuress, and no doubt a Protestant, Monsieur le Curé!"

The poor abbé was really very sore at heart, and, never doubting but that the new mistress of the castle would be no friend of his, he took his way homeward. In his imagination he saw this Mrs. Scott settled at the castle and despising his little Catholic church and all his simple services to the quiet village folk.

He was still brooding over the unhappy fate of Longueval, when his godson, Jean Reynaud—son of his old friend Dr. Reynaud—to whom he had been as good as a father, and who was worthy of the old priest's love, dismounted at his door. For Jean was now a lieutenant in the artillery stationed in the district, and much of his leisure was spent at the abbé's house.

Jean tried to console him by saying that even though this American Mrs. Scott were not a Catholic, she was known to be generous, and would no doubt give him money for the poor.

THE ABBÉ, TO HIS GREAT SURPRISE, FINDS TWO NEW PARISHIONERS

The abbé and his godson were in the garden next day, when they heard a carriage stop at the gate. Two ladies alighted, dressed in simple traveling costumes. They came into the garden, and the elder of the two, who seemed to be no more than twenty-five, came up to the Abbé Constantin, saying, with only the slightest foreign accent: "I am obliged to introduce myself, M. le Curé. I am Madame Scott, who yesterday bought the castle and estate, and if it is no inconvenience I should be glad to take five minutes of your time." Then, turning to her companion, she said: "This is my sister, Miss Bettina Percival, as you may have guessed."

Greatly agitated, the abbé bowed almost in silence, and led into his little vicarage the new mistress of Longueval and her sister. The cloth had been laid for the simple meal of the old priest and the lieutenant, and the ladies seemed charmed with the humble comfort of the place.

"Look now, Susie," said Miss Bettina to her sister, "isn't this just the sort of vicarage you hoped it would be?"

"And the abbé also, if he will allow me to say so," said Mrs. Scott. "For what did I say in the train this morning, Bettina, and only a little while ago in the carriage?"

"My sister said to me, M. le Curé," said Miss Percival, "that she desired, above all things, that the abbé should not be young, nor melancholy, nor severe; but that he should be white-haired and gentle and good."

"And that is you exactly, M. le Curé," said Mrs. Scott brightly. "I find you just as I had hoped, and I trust you may be as well pleased with your new parishioners."

"Parishioners!" exclaimed the abbé. "But then you are Catholics?"

"Certainly we are Catholics!" And, noting the surprise of the old abbé, she went on to say: "Ah, I understand, our name and our country made you expect we should be Protestants and unfriendly to you and your people. But our mother was a Canadian and a Catholic, of French origin, and that is why my sister and I speak French with just a little foreign accent.

How the sorrow of the village priest was turned to joy

"My husband is a Protestant, but he leaves me full liberty, and so my two children are being educated in my own faith. And that is why we have come to see you the first day we have arrived."

The good old priest was overwhelmed by the news, but his joy almost brought tears to his eyes when the ladies each presented him with a thousand francs, and promised five hundred francs a month for the poor. He had never handled so much money in all his life before.

"Why, there will be no poor left in all the district!" he stammered.

"And we should be glad if that were so," said Mrs. Scott, "for we have plenty, and we could not do better with it."

Then followed the happiest little dinner-party that had ever taken place beneath the abbé's roof. Mrs. Scott explained how her husband had bought the castle as a surprise for her, and that neither she nor her sister had seen it until that morning.

"Now tell me," she suggested, "what they said about the new owner." The old priest blushed, and was at a loss to answer. "Well, you are a soldier," she continued, turning to Lieutenant Reynaud, "and you will tell me. Did they say I had been a beggar?"

"Yes, I heard that said."

"And that I had been a performer in a traveling circus?"

"That also I heard said," he admitted.

The young lieutenant who wondered if he was in love

"I thank you for your frankness; and now let me tell you that, while I can see nothing in either case that would be any disgrace to me, the story does not happen to be true. I have known what it is to be poor, for my parents died eight years ago, leaving us only a great lawsuit, but my father's last wish was that we should fight it to the end. With the aid of the son of one of his old friends, now my husband, we fought and won. That is how I came into my fortune. The stories you have heard were invented by spiteful Paris journalists."

After the ladies had taken their departure for Paris, the Abbé Constantin was as happy as he had so lately been miserable. And as for Lieutenant Reynaud, the vision of their fresh and charming faces was with him all through the military manœuvres in which he was now engaged. But as both of them were equally charming in his mind, he concluded he could not have fallen in love, or he would have known which he admired the more.

He did not know how many the suitors were in Paris for Miss Bettina, and possibly if he had seen the sisters there among the fashionable people of that gay city he would never have given them a second thought, as he was a true son of the country, this healthy and manly young officer, whose tastes were as simple as the surroundings in which he had grown up demanded.

The young heiress who knew when she was in love

Miss Bettina, indeed, had only to say the word, and she might have been the Princess of Romanelli. "And I should like to be a princess, for the name sounds well," she said to herself. "Oh, if I only loved him!" There were many men of rank and title who would have been glad to have married the wealthy young American lady, but she found herself in love with none of them, and now she was looking forward to the fourteenth of June, when she and her

sister were to leave Paris for Longueval. During their stay at the castle they were to entertain many friends, but for ten days they were to be free to roam the woods and fields and forget the distractions of their fashionable life in the capital.

"But you forget," said Mrs. Scott, on their way to Longueval, "that we are to have two people to dinner to-night."

"Ah, but I shall be glad to welcome both of them—particularly the young lieutenant," Miss Bettina confessed to her sister, with a touch of shyness.

THE ABBÉ AND JEAN AS GUESTS OF THE NEW LADY OF LONGUEVAL CASTLE

Great alterations had been made at the castle during the month that had elapsed. The rooms had been refurnished, the stables and coach-houses were stocked, the pleasure-grounds made trim and beautiful, and servants were busy everywhere. When the abbé and Jean arrived, they were ushered in by two tall and dignified footmen, but Mrs. Scott received them with all the frankness she had shown at the vicarage, and presented her son Harry and her daughter Bella, who were six and five years old. Then Miss Percival joined them, and presently they were all talking together like old friends. Jean and Bettina found much to say to each other, and as the ladies were looking forward to riding round the estates, Jean, who rode every day for exercise, promised to join them. It was quite clear that Miss Bettina was glad to see them both —"particularly the young lieutenant!" And when Mrs. Scott and her sister walked up the avenue, after having accompanied Jean and the abbé to the gate, Bettina confessed that she expected to be scolded for being so friendly with Jean.

"But I shall not scold you," Mrs. Scott said, "for he has made a favorable impression on me from the first. He inspires me with confidence."

THE FRIENDSHIP OF JEAN AND BETTINA AND HOW IT GREW

"That is just how I feel towards him," said Bettina quietly.

As for Jean, he talked so much to Paul about his visit that that gay young man accused him of having fallen in love, but, of course, that was mere nonsense! There was no fear of Jean's falling in love! For a poor lieutenant could never dream of winning an heiress for his wife. When next he met Bettina they had a very long talk about their people, and it appeared that they were both descendants of French peasants. That was why Jean loved the country-folk around Longueval. And when he had served his time in the Army, he thought he would retire on half-pay—an old colonel, perhaps—and come back to live there.

"All alone?" asked Miss Bettina slyly.

"Why, I hope not."

"Oh, then you intend to marry!"

"Well, one may think of that, though one need not be always looking for a wife."

"Oh, but I know something of your affairs, and I have heard that you might have married a girl with a handsome fortune if you had wished."

"And how do you know that?" asked Jean.

"Monsieur le Curé told me. And may I ask why you did not take the chance?"

"Simply because I thought it better not to marry at all than to marry without love," was Jean's frank avowal.

WHAT HAPPENED WHEN JEAN RODE AWAY WITH HIS REGIMENT

"I think so, too," said Bettina; and suddenly the two young people, to their mutual surprise, found nothing more to say—nothing at all. So it was lucky for them that Harry and Bella burst into the room with an invitation to see their ponies.

Three weeks, during which Longueval had been crowded with visitors, passed, and the time came for Jean to take the road for the annual artillery practice. He would be away for twenty days, and, while he wished to be off, he wondered how those twenty days would pass without a sight of Bettina, for now he frankly adored her. He was happy and he was miserable. He knew by every action and every word that she loved him as truly as he loved her. But he felt it his duty to fight against his own heart's wish, lest the penniless lieutenant might be thought to covet the riches of the young heiress.

But he could not drag himself away without one last meeting. Yet when he saw how anxious Bettina was to please him and make him happy with her

friendship, he was afraid to hold her in his arms lest he might be tempted to tell her how full his heart was with love for her. She excused herself to Paul de Lavardens, so that she might give his dance to Jean; but Jean declined the favor on the plea that he was not feeling well, and to save himself he hastened off with scarcely a word of farewell.

But all this only told his secret the more clearly to the heart that loved him.

"I love him, dear Susie," said Bettina that night, "and I know that he loves me for myself; not for the money I possess."

"You are sure, my dear?"

"Yes, for he will not speak, he tries to avoid me. My horrid money, which attracts others to me, is the thing that keeps him from declaring his love."

"Be very sure, my dear, for you know you might have been a marchioness or a princess if you had wished. You are sure you will not mind being plain Madame Reynaud?"

"Absolutely; for I love him."

BETTINA'S PROPOSAL AND JEAN'S RESOLVE TO GO AWAY FROM LONGUEVAL

"Now let me make a proposal," Bettina went on. "Jean will be away for three weeks, and at the end of that time may I go and ask him if he will have me for his wife? Tell me, Susie, may I?"

Of course, her sister could but consent, and Bettina was happy.

Next morning she had a wild desire to wave Jean a good-bye. In the pouring rain she made her way through the woods to the terrace by the road, her dress torn by the thorns, and her umbrella lost, to wave to him as he passed, saying to herself that this would show him how dear he was in her thoughts.

Mr. Scott had come from Paris before Jean was back, and he, too, approved of Bettina's plan, for they wished her to marry only one she truly loved. But when the lieutenant came back with his regiment, he had made up his mind to avoid meeting Bettina, and had even decided to exchange into another regiment. He refused an invitation to the castle, but the good abbé begged of him not to leave the district.

"Wait a little, until the good God calls me; do not go now."

Jean urged that honor made it clear to him he should go away. The abbé told him that he was quite sure Bettina's heart was all for him as truly as he believed Jean's love was all for her. Her money, Jean confessed, was the great drawback, as it might make others think lightly of his love for her. Besides, he was a soldier, and he could not condemn her to the life of a soldier's wife.

WHAT BETTINA CONFESSED TO THE ABBÉ, AND THE OLD PRIEST'S ADVICE

The abbé was still trying to convince his godson, when there came a knock at the door, and the old man, opening it, admitted—Bettina!

She went straight to Jean and took him by both hands, saying: "I must go to him first, for less than three weeks ago he was suffering!" The young lieutenant stood speechless. "And now to you, M. le Curé, let me confess. But do not go away, Jean, for it is a public confession. What I have to say I would have said to-night at the castle, but Jean has declined our invitation, and so I have come here to say it to M. le Curé."

And thus it was to the Abbé Constantin that she confessed her love for Jean and her firm resolve to marry someone who loved her for herself. Jean, before this frankness and this courage, had to speak the truth of the love that was in him, and Bettina explained that she would not think of asking him to give up his career as a soldier.

"And now, M. le Curé, it is not to him but to you that I speak. Tell me, should he not agree to be my husband?"

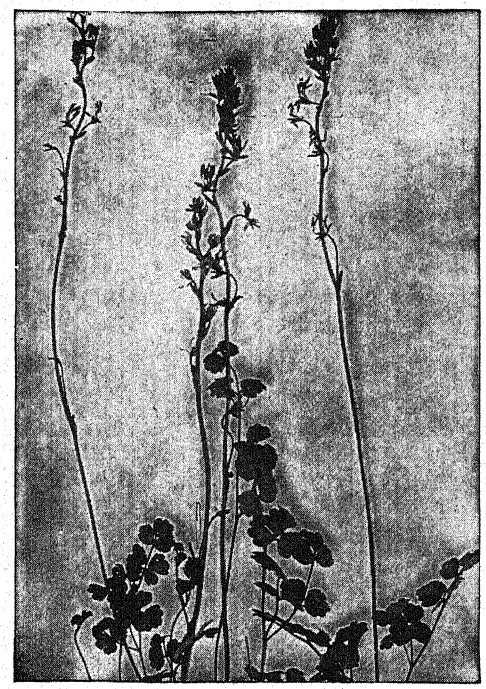
"Jean," said the old priest gravely, "marry her. It is your duty, and it will be your happiness."

Jean took Bettina in his arms, but she gently freed herself and said to the abbé: "I wish—I wish your blessing." And the old priest replied by kissing her paternally on both cheeks.

THE HAPPIEST DAY IN THE LIFE OF THE ABBÉ CONSTANTIN

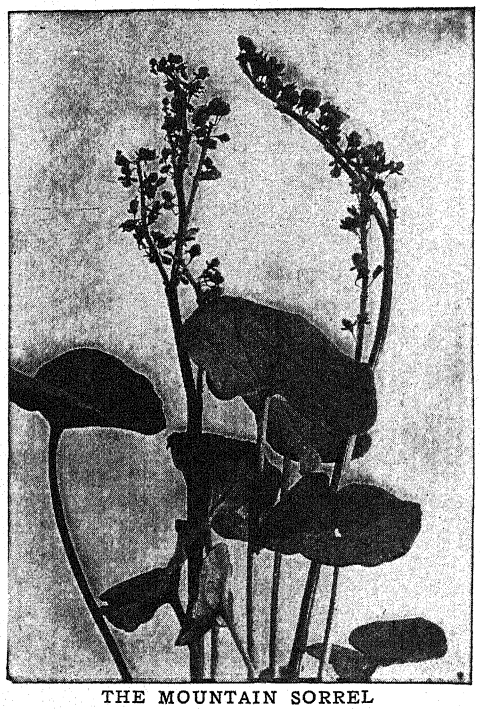
One month later the Abbé Constantin had the happiness of performing the marriage ceremony in his little church, where he had consecrated all the happiness and goodness of his life. It was a great day. Jean's brother officers took part in the rejoicings, and the festivities which took place at the castle exceeded anything the abbé had ever imagined in his simple life.

THE NEXT FAMOUS BOOKS ARE ON PAGE 4909.



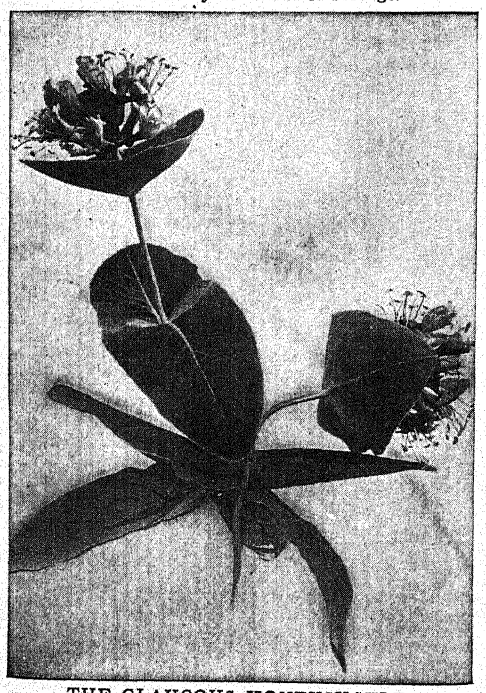
THE ALPINE MEADOW-RUE

This graceful little plant, with its purple flowers, is found principally upon the mountains of Wales and Scotland, and grows about six or eight inches high. It is unlike the family to which it belongs.



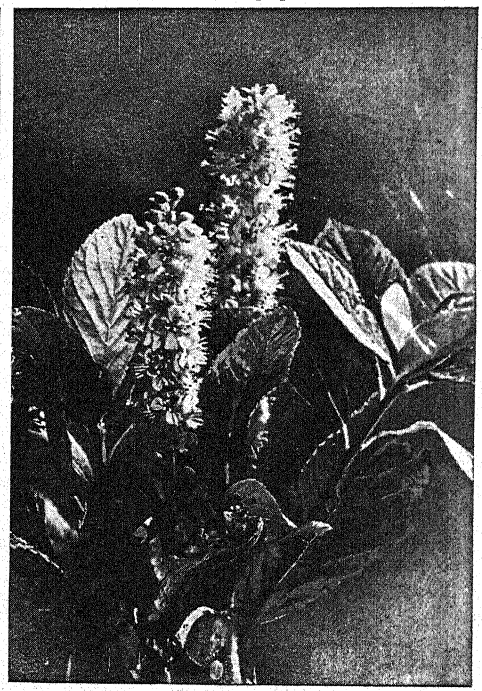
THE MOUNTAIN SORREL

This plant resembles the common sorrel of our meadows, but is shorter and stouter. The leaves grow on long stalks, and the green flowers are in clustered spikes. It grows in damp places on mountains.



THE GLAUCOUS HONEYSUCKLE

This honeysuckle is a midsummer bloomer, which stands upright, holding in its thick double leaves, as in a bouquet-holder, clusters of honey-colored flowers resembling those of the cultivated honeysuckle.



THE CLETHRA

Clethra can be easily found in swampy lands of the Atlantic coast by the rich, far-flung odor of its waxy flowers, projecting like spearheads from bushes crowded among alders, which these shrubs resemble.



FLOWERS OF ROCKY PLACES

CONTINUED FROM 4660

MANY boys and girls are fortunate enough to live at the foot of some mountain. Some may even dwell in lonely farmhouses upon the slopes. These children have splendid chances for the study of wild flowers, for not only do the mountains provide many kinds such as we cannot find growing wild anywhere in the lowlands, but many of the lowland plants will also grow on the mountain-side. Some of the lowland plants will not grow at a greater height than a thousand feet above sea-level; and some mountain plants will not grow upon soil less than two thousand feet high and so on. On the other hand, we may find certain lowland plants growing at various heights.

The term " plants of rocky places " generally means, in America, those of hilly or mountainous country, as our beaches are chiefly sandy. They have no particular character, such as the fleshiness of maritime plants, except in the case of those growing upon the tops of high mountains. In such a position extremes of heat and cold have to be combated, drought is frequent, snow is often present near by, and the winds are terrific. Consequently only those plants, that, through the ages, have adapted themselves to these conditions, survive. One finds that, usually, these " alpine " plants (as those which grow on mountain tops above timber-line are called, whether in the Swiss Alps or not) are peculiarly dwarfed, spreading mat-like, in squat, tufted masses, but with brilliant flowers larger than the size of the plant would seem to call for. This compact form, combined with masses of bloom and a certain resistance to drought and to heat and cold, has made the alpine vegetation welcome to the gardener, who plants them on the tiny hillocks he erects in his rockery, and finds that they continue to thrive and bloom.

The low stature of the plants, and their close-set branches are, of course, the best form with which to resist the winds, and meet their other trials. A tall plant would soon be blown off, and the trees, and shrubs, as well as the herbs found high on mountains, are so dwarfed, twisted and contracted, as to seem quite unrelated to others of their kind growing at the base. As for their brilliantly-hued, large flowers, it is said that " on the heights above the tree-line there is actually no spring and no autumn, only a short summer following a long winter. All the flowers have therefore to blossom in this

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short time, and all the flower-visiting insects must do their flying about during the short period which is free from snow, if they do not wish to starve." Therefore, as soon as the snow is melted the flowers appear in every color, to allure the bees, butterflies and flies that depend upon their honey and pollen. By these means, the insects are satisfied, and in one way or another, they transfer pollen from the anthers of one flower to the pistil of another of the same kind.

There is one family which contains many of these alpine plants,—the Saxifrage family, the name meaning "stone-breaker" and given because the varieties so often spring out of cracks and pockets in cliffs, quite as if they had split the hard rocks to make room for themselves. But some of them, although growing on mountains of the Old World, belong to less elevated places in the New, especially in Northern Canada, where they may be found far up in the Arctic regions, where the climate is much like that of mountain peaks. Thence they sometimes follow the great, cool-topped mountain ranges into the United States, but, generally speaking, rarely occur south of Canada.

MOUNTAIN SAXIFRAGE GROWS NEAR MOUNTAIN RILLS

One such southward growing species is the yellow, or mountain saxifrage, that is found about the rock-rills that come down the mountain-sides, where its narrow, oblong leaves form large green cushions, a foot across. The flowering stems stand well above the cushions and bear a number of scattered flowers, whose yellow petals are dotted with red. The petals stand wide apart and the space is partly filled by the green sepals, upon each of which lies a golden stamen.

AN ORPINE WHICH HAS A ROSE-SCENTED ROOT

Another northern plant that is frequently cultivated is the rose-root, which is very closely allied to the saxifrages, but is included in that curious family of fleshy plants, the Orpines, which can flourish in the most unlikely dry and barren places, and which include the live-forever, and the stone-crop. This one, however, unlike most of its family, likes rocks dripping with moisture, and produces thick, fleshy stems, and thick, gray-green leaves that are flat, nearly round, and more than one inch across. Its little, waxy flowers are grouped in massive heads varying from yellow to purple in tint. Its branching root-stock, when broken, exhales an odor of roses.

THE PINK OR PURPLE FLOWERS OF THE MOSS-CAMPION

A low habit like that of the saxifrages is to be noticed in several of the Pink family when rooted upon rocks. One of these is the moss-campion, a plant that is only an inch or two high with slender awl-shaped leaves. The stems grow in dense spreading tufts that look much like a growth of bright green moss into which somebody has stuck a number of pink or pale purple flowers.

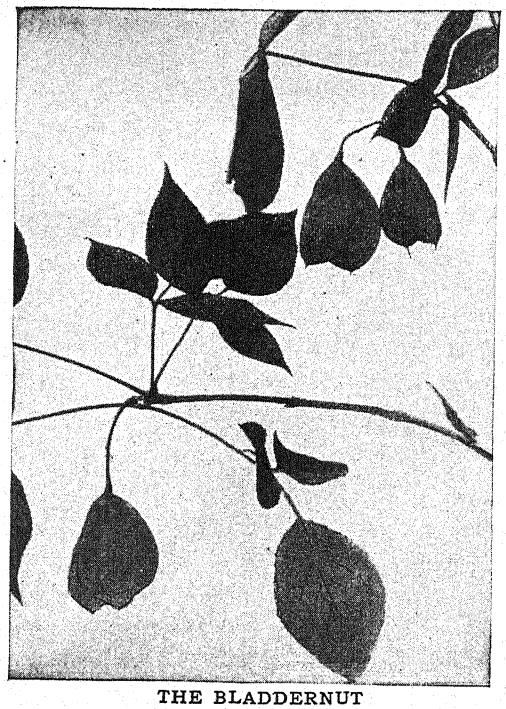
These flowers have no visible stalks, and although they are only half an inch across, they look so big in proportion to the leaves that they appear to have been plucked from some larger plant, and set among moss. They are of similar structure to the red campion and white campion of lowland fields and hedgerows. Like the other, it is most frequent in the far north, as is the taller mountain sorrel.

MOUNTAIN SORREL AND THE ALPINE MEADOW-RUE

This herb we shall not fail to recognize as one of the relations of the common sorrel of lowland fields, although its kidney-shaped leaves differ so much from the common kind. Its spray of flowers, however, allows us to make no mistake. Closely examined, they will be found to have only four sepals, while other sorrels and docks have six. It is not unlikely to be accompanied by the alpine meadow-rue, whose small leaves, with rounded leaflets in sets of three, are gathered into tufts. This herb does not look very much like the buttercups to whose family it nevertheless belongs, but closely resembles our other meadow-rues in its tossing tassels of stamens.

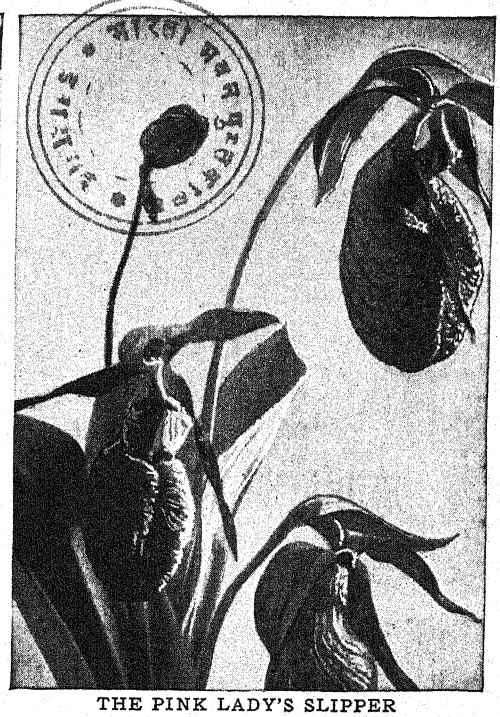
THE COLUMBINE PROVIDES THE HUMMING-BIRD WITH FOOD

Neither would the columbine suggest a buttercup, although a member of the latter's family, as it flaunts its jewel-like gold and scarlet flowers on rocky hillsides. Fitted as they are on slender stems, that are thrust out from tiny clefts in a rock-face, the columbines tremble in every whiff of wind, and send their yellow pollen flying, to alight on the outstanding pistils of other columbines. Nor are they neglected by insects, though only those with long tongues can reach up into the tips of the horns, where the honey-drops



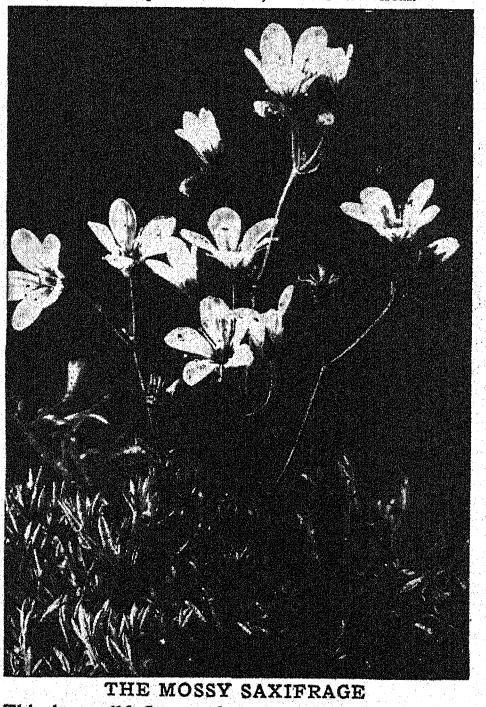
THE BLADDERNUT

These are the quaint pouch-like fruits which give its name to the bladdernut,—a shrub which in spring shows us white flowers. The leaflets are in threes. They are mostly small trees, but ornamental.



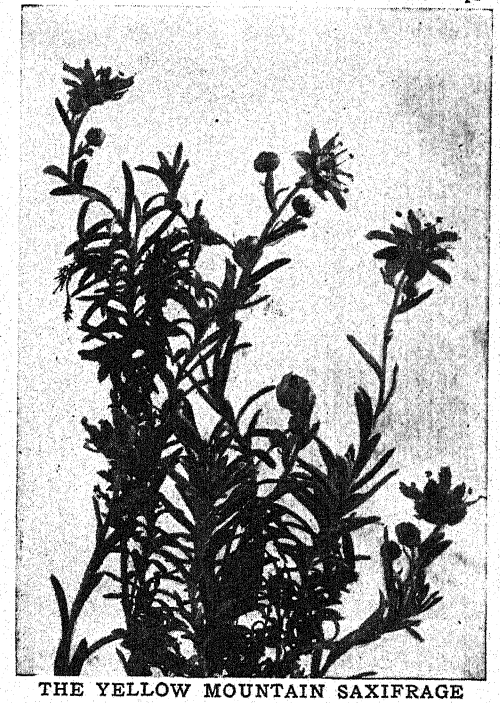
THE PINK LADY'S SLIPPER

Velvety pink lady's slippers nod over sandy forest floors in early spring. The Greek name Cypripedium (or Venus' buskin), and the Indian one, "Moccasin-flower," both refer to the shoe-like form of the "lip."



THE MOSSY SAXIFRAGE

This is a wild flower of the mountains that is frequently grown in our gardens. It is picturesque with its erect shoots bearing white flowers, and is useful in a rock garden. The leaves are divided into lobes.



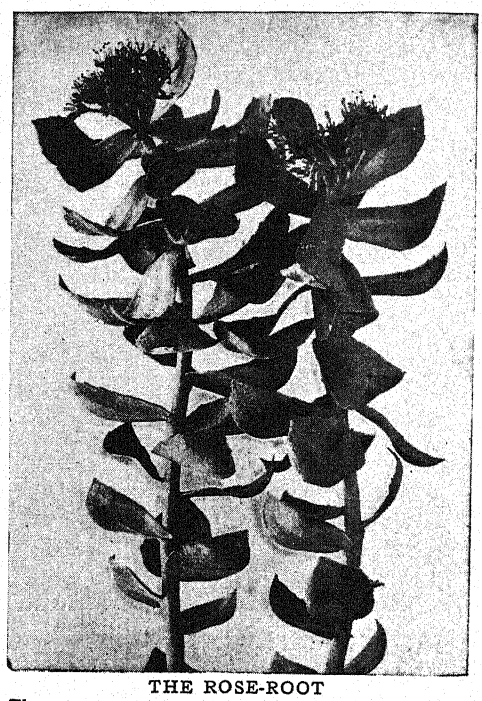
THE YELLOW MOUNTAIN SAXIFRAGE

This is another of the saxifrages, many of which grow only in the mountain regions of the North and East. This plant is found in swamps and in wet places, and the flowers are yellow.



THE BILBERRY

The bilberry is a plant of many names, whortleberry, whinberry, and myrtleberry being most familiar. The leaves are egg-shaped, and the flowers, flesh-colored and wax-like, are found on hill and mountain.



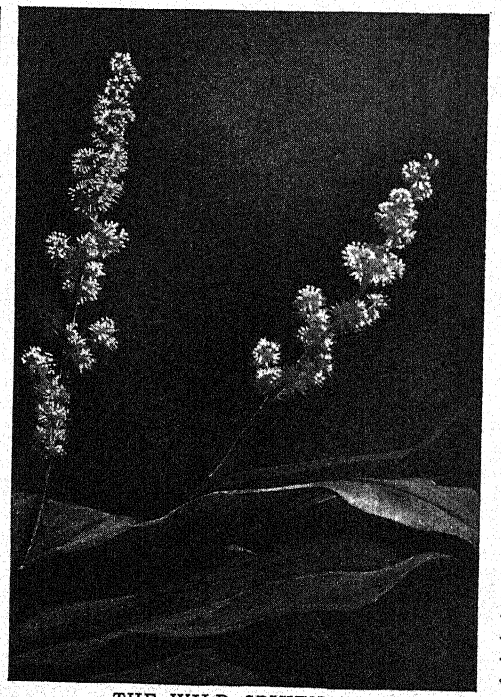
THE ROSE-ROOT

The rose-root is found only in the mountainous districts of the North and in Ireland. It is a relation of the stonecrop. The flowers grow in a dense mass at the tops of the erect stems, and are usually yellow.



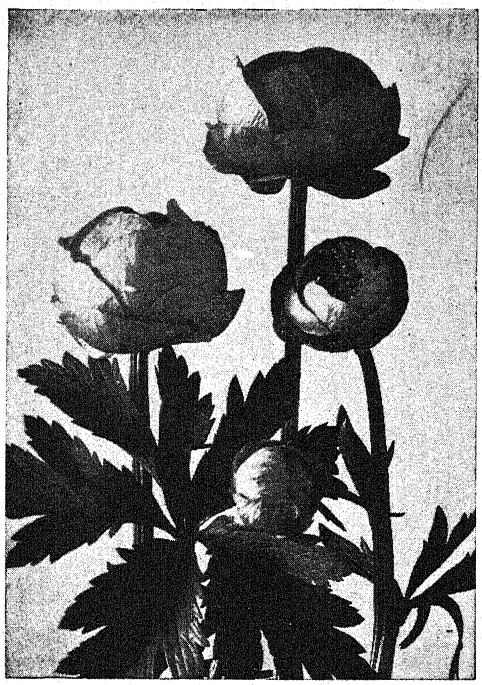
THE WILD GOOSEBERRY

The American wild gooseberry flourishes in rocky woods, rooted in the clefts of cliffs and ledges. Its berries look like those of the garden bush but are considerably smaller and more tart to the taste.



THE WILD SPIKENARD

The wild spikenard is one of the loveliest plants of our woods, its white, starry little flowers gleaming in the green shadows. In autumn they give place to the charming scarlet berries of the thickets.



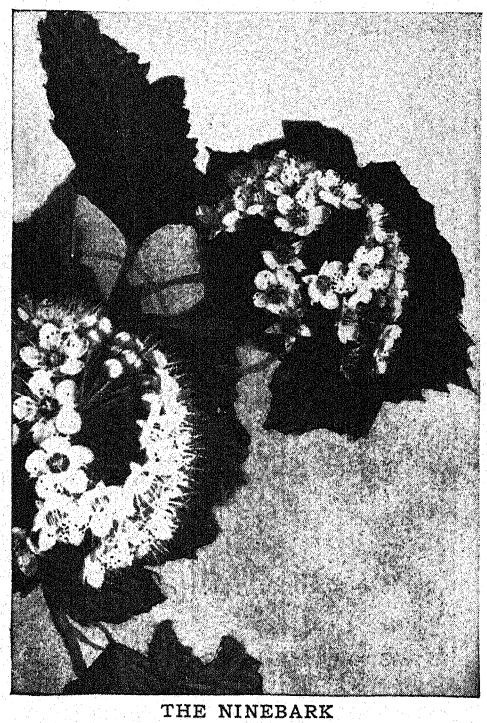
THE GLOBE-FLOWER

This large and handsome plant belongs to the buttercup family. Its flowers are pale yellow, and grow into the form of a ball or globe, whence its name.



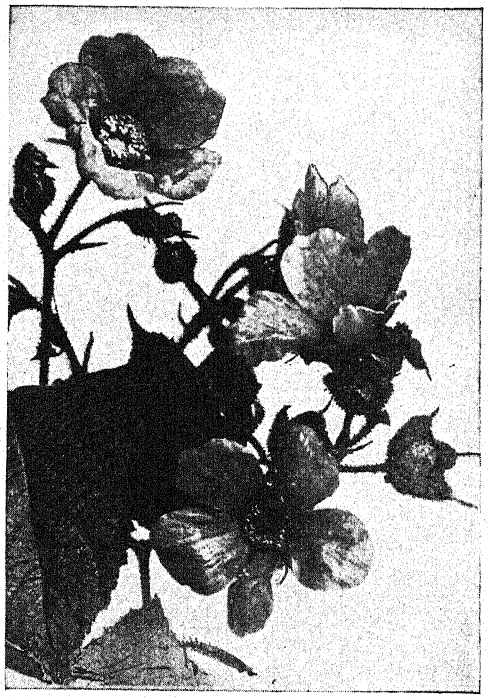
THE MOSS-CAMPION

This densely-tufted, mossy plant, with the pink and white flowers and the awl-shaped leaves, is found growing only on the summits of higher mountains.



THE NINEBARK

The ninebark has long drooping branches, often swaying down to the grass, in midsummer loaded with ball-like clusters of lovely little snow-white blossoms. It belongs to the fragrant rose family.



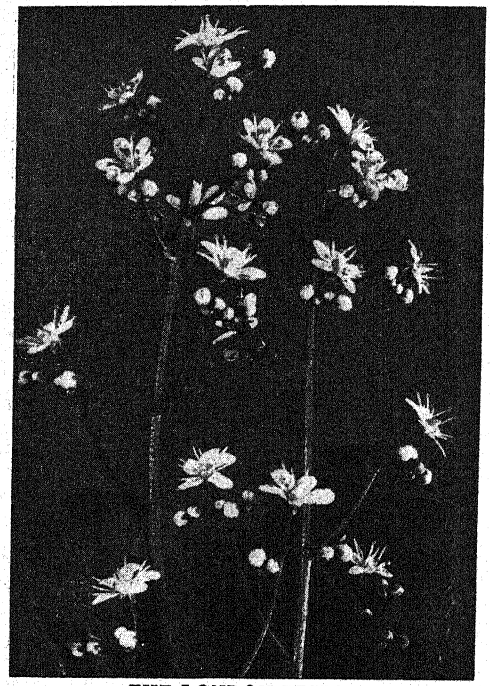
THE FLOWERING RASPBERRY

This gaudy bush shows itself a kind of raspberry, but its flowers alone might deceive one into thinking it a wild rose, to which family it belongs. Its fruit is more pretty than useful. It blooms late in summer.



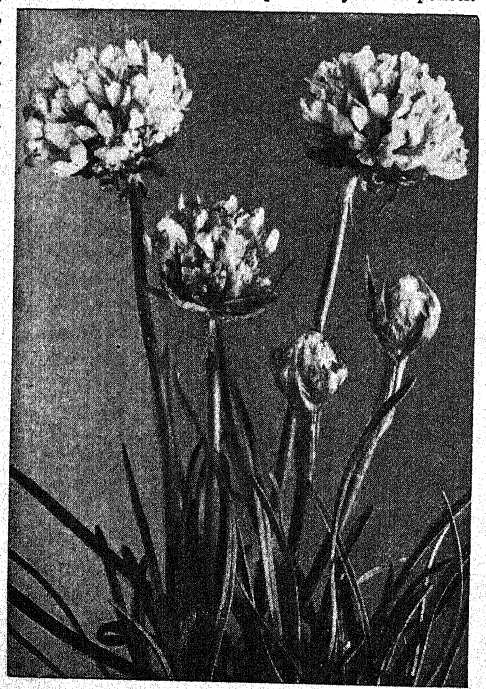
THE BALSAM

The balsam, or jewel-weed, grows in mountain swamps. Its golden flowers quiver on slender stalks; the ripe seed-vessels open at the slightest touch, ejecting the seeds, whence another name—touch-me-not—and it bombards passers-by with pellets.



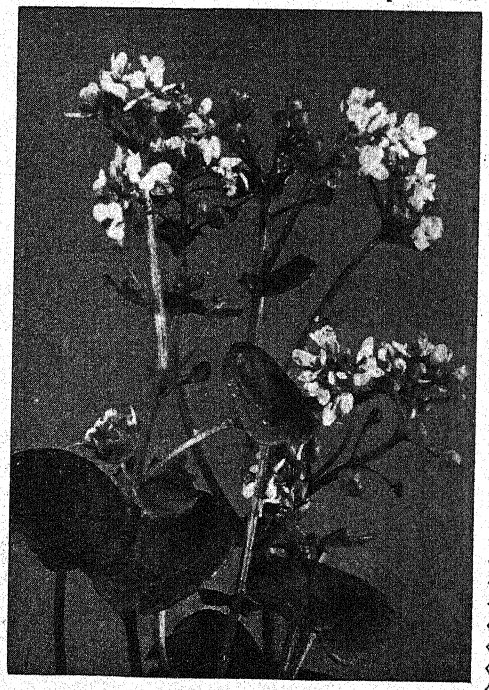
THE LONDON PRIDE

We know this plant, which grows wild on the mountains of Ireland, as the none-so-pretty, or St. Patrick's cabbage of the garden. The name London Pride is due to the fact that the plant thrives even in London, where soft-coal smoke ruins plant life.



THE SEA-PINK

The sea-pink, or thrift, is found on seashores and the tops of mountains. The fleshy leaves grow in dense tufts, and the rose-colored flowers in round clusters at the ends of the stalks. It often grows in gardens.



THE COMMON SCURVY-GRASS

The scurvy-grass is not a grass at all, but is a member of the cabbage family. It is a small plant with white flowers, and grows usually on muddy seashores, but it is also found on lofty mountains.

are. Humming-birds stab flower after flower, thrusting them back against the rock with their rapid assaults as they swiftly probe each spur. In the American species the horn-like spurs of the petals are not so strong and hooked as those of Europe, whose size gave rise to the quaint notion that they resembled the necks of doves billing across the stem; whence the name columbine from the Latin word *columba,* which means a dove.

THE BILBERRY OF THE NORTHERN MOUNTAINS

High on the northern mountain ranges of both hemispheres we find the great bilberry, a thick-leaved little shrub with blue-black, bloom-covered berries that the Scotch call bleaberry. It belongs to the Huckleberry family, is a near relative of our huckleberries and of the European whortleberry or myrtleberry, and looks very like them.

Its nearly closed, waxy, white or pinkish bells bend stiffly downwards, and when a bee clings to the flowers' opening, and pushes its tongue in to reach the nectar, its head is almost certain to push against the tails of the anthers; and the act, by tilting the tube of the anther and springing the tip, in which there is a chink, away from the pistil, allows a shower of pollen to fall upon the bee's face. We can see from the position of the pistil that when the bee visits the next flower, this pollen will be scraped off upon the stigma.

THE PALE-GREEN PRICKLY FRUIT OF THE WILD GOOSEBERRY

There is one little bush, easily recognized, for it closely resembles the cultivated gooseberry, and, in fact, is merely a wild species of gooseberry. It is apt to grow in shady woods, in pockets of the rocks, and often the slender branches, bent down by the weight of the pale-green spiked berries, droop from the ledges of high cliffs. It furnishes a tart, wild fruit for sweetmeats, more highly flavored than the tamer kinds, but more generous as to prickles, although these are somewhat softened by cooking.

THE FLOWERING RASPBERRY

Near the gooseberry, but on sunnier ledges, grows another scraggly, brittle-stemmed bush, bearing fruit quickly identified as raspberries,—but very dry and unpalatable raspberries. The whole shrub is furry in appearance. The great maple-like leaves are softly green and the crumpled, magenta-colored petals emerge from a collection of hairy sepals and stems. Even the bright scarlet, flattish, fruits are fuzzy. This is known as the flowering raspberry, and it blooms profusely during late summer, the flowers resembling those wild-roses in whose family the shrub is placed.

FLOWERS OF THE HONEYSUCKLE FAMILY BELOVED BY INSECTS

Several members of the tribe of honeysuckles, both upright shrubs and trailing vines, display themselves on our rough hillsides. One of the earliest plants to bloom is the fly-honeysuckle, with its pale yellow, twin flowers: much later comes the half-climbing, half-upright, glaucous honeysuckle, with its close branches of honey-colored, green and purple-tinged flowers, very like those of the cultivated honeysuckles, but half hidden by the wide flaring cup formed beneath them by the union of the uppermost pair of leaves on the stalk.

On dry and rocky ledges, especially common on the islets of the St. Lawrence River, blooms the bush-honeysuckle, or diervilla, which has long-pointed, opposite leaves and yellow flowers very attractive to bees and other winged insects.

BLACKBERRIES LIKE TO GROW IN ROCKY, MARSHY PLACES

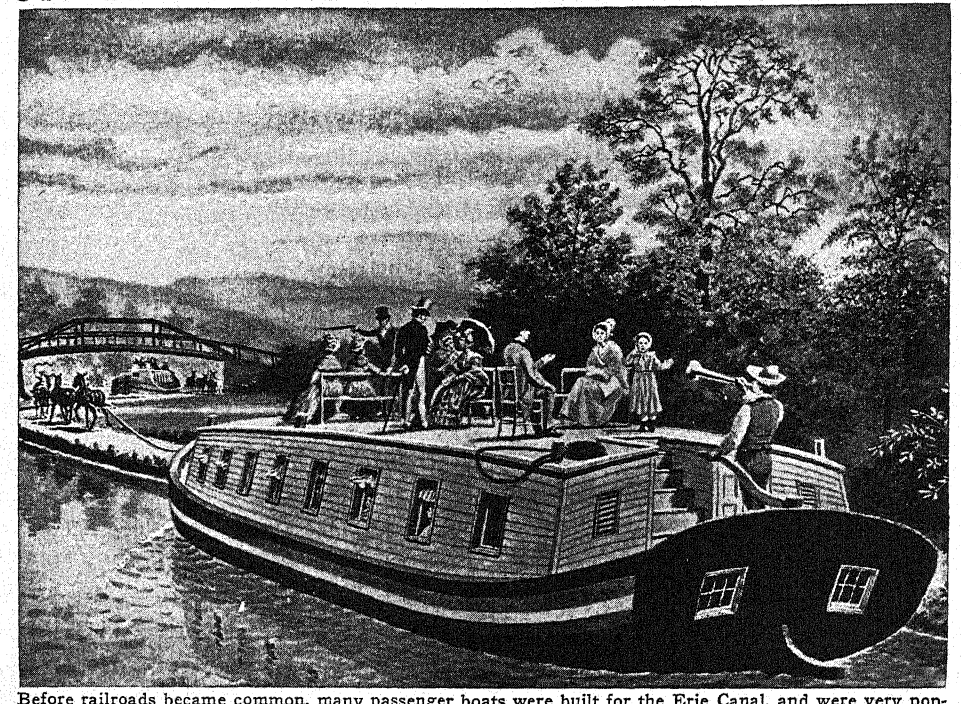
Some blackberries have adjusted themselves to life in hot sands, and creep valiantly under a blazing sun, bearing large white five petaled flowers like single roses, and, later, the succulent, pulpy fruit that we call dew-berries. But the tall blackberries prefer rocky marshy soil where they can find water to swell their long luscious berries, not fully ripe until the birds begin to steal them. Brandy or cordial made from these berries is used in medicine.

THE CREAMY CLETHRA FLOWERS GIVE HONEY TO THE BEES

The clethra shrub is sometimes known as a sweet pepper bush or white alder. Although it grows generally among the ordinary alders at the edge of swamp or stream, one species inhabits mountains. The foliage is not unlike that of ordinary alders, but it is the long spikes of creamy-tinted, waxy, thick-petaled little flowers, heavily perfumed and yielding honey for bees, which render the clethra interesting.

THE NEXT NATURE STORY IS ON PAGE 4881.

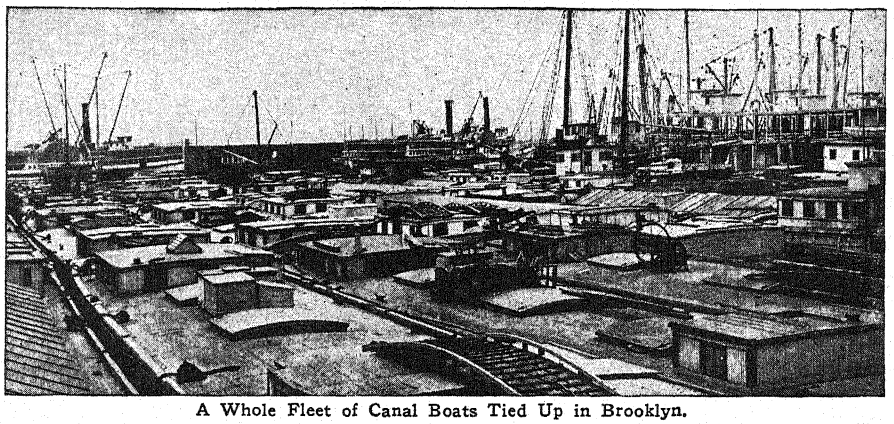
ON THE ERIE CANAL IN THE EARLY DAYS



Before railroads became common, many passenger boats were built for the Erie Canal, and were very popular. This picture, made from a water-color of the time, shows the boat drawn by three horses going smoothly at the rate of four or five miles an hour, while the passengers talked, read or looked at the scenery. Sleeping quarters were arranged below.



Flourishing cities grew up along the canal and in several cases the canal is now bordered by high buildings and busy streets. Here we see boats loading and unloading in the heart of the city of Syracuse. Progress is necessarily slow, as many bridges bar the way and must swing aside or rise to allow the boats to pass. Many of the little towns along the canal added "port" to their names because of their location.



A Whole Fleet of Canal Boats Tied Up in Brooklyn.

THE ERIE CANAL

CONTINUED FROM 4743

BEFORE the steam engine was invented and railroads were built, cities and towns were chiefly found near the sea or along the rivers. The ancient nations that first became civilized inhabited regions about the big waters. Babylon was on the Euphrates, the Egyptians lived on the banks of the Nile, and the Greeks inhabited the islands and the shores of the Ægean Sea. England, surrounded by sea and watered by rivers, was the first country in Northern Europe to become densely populated.

The reason is simple. In those days water was the only practical means of long distance transportation. Manufacturing, even of a primitive kind, was impossible away from the water because the manufacturers could not ship their wares to the markets. For the same reason it did not pay the farmers to raise more produce than they themselves could consume. There were a few exceptions, such as the cattle raisers; they could drive their cattle to market over long distances. Their produce transported itself.

EARLY TRANSPORTATION BY WATER

The manufacturers and the farmers near the water could produce larger quantities, for they could load their wares and their produce on boats or ships, at comparatively little expense, and send them even to other countries. Consequently all manufacturers and farmers wanted to be near the water. It was trade that developed civilization, but it was water transportation that made trade possible.

Railroads have since changed these conditions. Without the railroads the interior of our vast country would still be wild prairie and forest. Freight cars serve on land as ships serve on the water, but water has not lost all of its old-time importance. Even to-day there are few really big cities far inland.

But at the time the American colonies had freed themselves from England, and for long afterwards, there was no thought of railways. Steam had not yet been put to practical use. The population of the new United States was then confined to the Atlantic seacoast and the river valleys. Boston, New York and Philadelphia had become the most important cities because they had protected harbors for shipping.

Meanwhile there had been some migration westward, through the wil-

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derness. The regions bordering on the shores of the Great Lakes and along the many rivers feeding them, consisted of low, rolling country, especially adapted to the raising of grains.

MEN LOOK TO THE WEST

Very early in the history of our country, there had been far-seeing men among the colonists who saw the tremendous advantages to the colonies that would follow establishing some means of transportation between the rich, agricultural regions west of the Alleghanies and the Atlantic seacoast. The lands along the coast were not adapted to wheat growing, yet the population needed wheat. With easy transportation, the farmers of the West would not only be able to supply this demand, but they would also be able to export their grains to Europe. Such a route would also render the wilderness between New York and the lake country habitable, for the settlers along the way would also be able to ship their produce to market.

George Washington, practical surveyor and engineer, was one of the first to have his imagination roused by these possibilities. He had explored the country between Albany on the Hudson and Buffalo on Lake Erie. Already much of this region was traversed by water routes. He became an enthusiastic advocate for connecting these waterways by canals, so that boats might pass from New York to the interior. To him it was not only a question of trade. If the sturdy settlers who had cleared their little homesteads in the Western wildernesses were not offered a means of communication with the states in the East, they would turn toward the power which held the Mississippi. Give them an outlet to the Atlantic coast and they would naturally maintain their allegiance to the States. To Washington and many others a waterway from the Great Lakes to the Hudson was necessary to develop a great, united nation.

Possibly it was only those of big, broad minds who saw it from this point of view. More numerous were the merchants and tradesmen of New York, who, for more selfish reasons, agitated the idea with much energy. They feared the commercial rivalry of Boston and Philadelphia. With Western grain, exported to Europe, passing through New York, that city would become the great trade centre of the country, its most important seaport. They finally compelled the state legislature to take action.

FIRST DISCUSSION OF A GREAT CANAL

In 1791 the legislature had ordered a survey made. Engineers were sent to study the country between Albany and Lake Erie and report on the possibility of digging a through waterway between those two points. Their report was warmly in favor of the undertaking. And so the first actual step was taken toward the digging of the Erie Canal.

Travelers of that period have left interesting records of the difficulties to be encountered on the way. From New York City they journeyed from two to five days on sailing boats up to Albany, thence overland seventeen miles to Schenectady. Here they embarked again on boats, propelled by oars and sail, and sometimes, over shallow stretches, by means of poles. After traveling 104 miles in this fashion, at the rate of about twenty miles a day, they would reach Utica, a small, log hut settlement. Another nine days' journey by water and land brought them to Oswego, on Lake Ontario. Naturally very little merchandise was sent over this route, but such as was sent cost $100 a ton, or more, for freight.

PRIVATE INDIVIDUALS FAIL TO DIG A CANAL

At first the state attempted to encourage private companies to undertake the vast work of cutting through the waterway. Some were organized and even began work; short sections of canal were dug, connecting some of the various rivers and lakes on the way. But in those days there were few rich men and it was found impossible to raise enough capital to finance the whole undertaking.

One of the most enthusiastic advocates of the scheme was Gouverneur Morris, then representing New York in the United States Senate. "Some day," said he, "ships will sail from London bound for Buffalo, via the Hudson River." It was he who interested DeWitt Clinton in the idea, the man whose determination and energy was yet to bring it to a complete realization.

It was nearly twenty years after the first survey had been made before the state again took action. By this time it was obvious that the private companies could not accomplish much. So, in 1810,

the Legislature appointed a canal commission to go to Washington and lay the matter before the President and Congress. As George Washington had already said years before, an Erie Canal was of great national importance; it would unite the nation; the East with what was then the West. The cost had been estimated at five million dollars. Private capitalists could not subscribe such an amount, but surely Congress could appropriate such a sum for a work of such importance.

DE WITT CLINTON AND THE ERIE CANAL

But in those days Congress did not make five million dollar appropriations so readily as it does now. There was much discussion and powerful opposition. Then came the War of 1812, and the Federal Government had other matters to which it must devote its energy and funds. It was then that DeWitt Clinton began publicly to agitate the digging of the canal. And finally, in 1816, the governor of New York appointed a new canal commission, authorized to raise a loan which would be guaranteed by the state. At the head of this commission the governor placed De Witt Clinton.

To test the interest of the people of the state in the canal scheme, Clinton made it a political issue; in the following year, 1817, he became a candidate for governor, promising that if he were chosen he would make the digging of the canal his chief business. And he was elected, by one of the biggest majorities that ever put an official into office. On July 1st he was inaugurated. Three days later, on Independence Day, he went up to Rome, on the Mohawk River, attended by his staff; and began the digging of the canal by turning up the first shovelful of earth.

According to the plans, the canal was to be forty feet wide at the top, twenty-eight feet at the bottom and four feet deep. The cost would be about five million dollars. It was the size of the work that was most remarkable; as a feat of engineering skill it was then unusual, but, when compared with the great works that are undertaken in the present time, it was not especially difficult.

Yet there were many supposedly well educated people in those days who thought the Erie Canal a wild dream. "You cannot make water run uphill," they said, though the theory of locks, by means of which barges could be lifted to higher levels, had already been put into practice in canals abroad. The digging began. In two years a section fifteen miles in length was finished, connecting Rome with Utica. The next year the canal reached the Seneca River.

WHEN THE CANAL WAS FINALLY COMPLETED

DeWitt Clinton had said that the work would be completed in 1823, but this promise was not fulfilled. It went more slowly than had been expected. His political enemies made the most of this in the next gubernatorial campaign. In spite of this he had been re-elected to a second term, but by a very slender majority. Plainly the people were growing discouraged with the slow progress of the canal work. At the next election, in 1822, Clinton had not even been nominated as a candidate. His opponents came into office, though he remained the head of the canal commission. And then the governor removed him from that office, which he had held since 1810, even while governor. His enemies, those who had been against the canal from the beginning, a political ring known as the "Albany Regency," seemed to have triumphed. After this humiliation it was thought that Clinton's public career was ended.

But the man who had transformed talk into action was not to be overcome so easily. Under the Albany Regency the work on the canal almost came to a standstill. This caused even more dissatisfaction than the slow progress. So two years later, in 1824, Clinton found himself with enough friends to be nominated as candidate for governor once more. And when the election came around he was again put into office by a great majority. Once more in office and at the head of his old canal commission, he began pushing the work with renewed energy. And a year later, October 26, 1825, the work was completed and the opening ceremony was celebrated.

CEREMONIES WHEN THE CANAL WAS COMPLETED

The first boat to enter the canal at Buffalo was the Seneca Chief, a luxurious passenger packet. On board were Governor Clinton, his family, his friends and his official staff. A team of four powerful gray horses hauled it along, and as they began treading the towpath, a

cannon at the entrance of the canal announced the official opening. A minute later another cannon boomed forth, some miles away, then a third, far off in the distance, almost beyond hearing.

These cannon were the first of a series of several hundred cannon, stationed at intervals along the canal, reaching down along the Hudson to New York, each barely within sound of the other. And so the news of the opening was flashed down to New York, as fast as sound could travel, passing down the line in one hour and twenty minutes.

Following the Seneca Chief into the canal came a procession of barges, each gaily decorated with flags and flowers, crowded with people. One, called Noah's Ark, carried as passengers a bear, two fawns, two eagles, two raccoons and two Indians. And so the procession continued along the canal toward Albany. All along the route it was met with music and cheering crowds of farmers, most of whom had settled in anticipation of the benefits they would derive from the canal.

At Albany the barges were greeted with the booming of cannon, a grand military procession and a citizens' parade. Here the flotilla of barges glided into the Hudson and began its journey down the river to New York. The Washington, a new steamer, one of the first afloat on the Hudson, came up to meet them. "Where are you from and whither bound?" it signaled.

"From Lake Erie, bound for Sandy Hook," replied the Seneca Chief.

The Washington and the Seneca Chief leading, the procession continued, passed New York to the sound of ringing bells and booming cannon and continued down the harbor toward the Narrows. The journey from Buffalo had taken just nine days.

THE WATERS OF LAKE ERIE MINGLE WITH THE OCEAN

Outside the Narrows the flotilla paused. Then the governor lifted a keg, containing water from Lake Erie, which he poured into the Atlantic Ocean, to signify the union of the two waters. Another keg, containing a mixture of waters from all the great rivers of the world, from the Ganges, the Thames, the Nile, the Amazon, was also poured over, to indicate that the commerce from all parts of the world would now pass that way. As the governor pronounced the official address tears streamed from his eyes. For twenty years he had talked and worked for the canal, at times apparently on the verge of failure. Now he had triumphed.

The celebration that welcomed the governor and his companions in New York City exceeded anything of the kind that had ever taken place before. Military and citizens' parades thronged the streets. All the trades were represented, the fire department leading. Heading the marching printers was a wagon carrying a printing press. And as the procession marched, the press turned out leaflets bearing the printed verse:

"'Tis done! 'Tis done! The mighty chain
Which joins bright Erie to the Main,
For ages shall perpetuate
The glories of our native state."

The Erie Canal more than realized the expectations of those who had advocated its construction years before. Even as a mere business enterprise it proved a success from the beginning. In 1825, the year in which the work was completed, the tolls collected along the finished part of the route amounted to over half a million dollars. Five years later, in 1830, the state collected a million dollars in tolls. By the end of 1837, only twelve years after it had been opened, the Erie Canal had paid fifteen million dollars into the treasury, which was more than the cost of digging and maintaining it in repair combined.

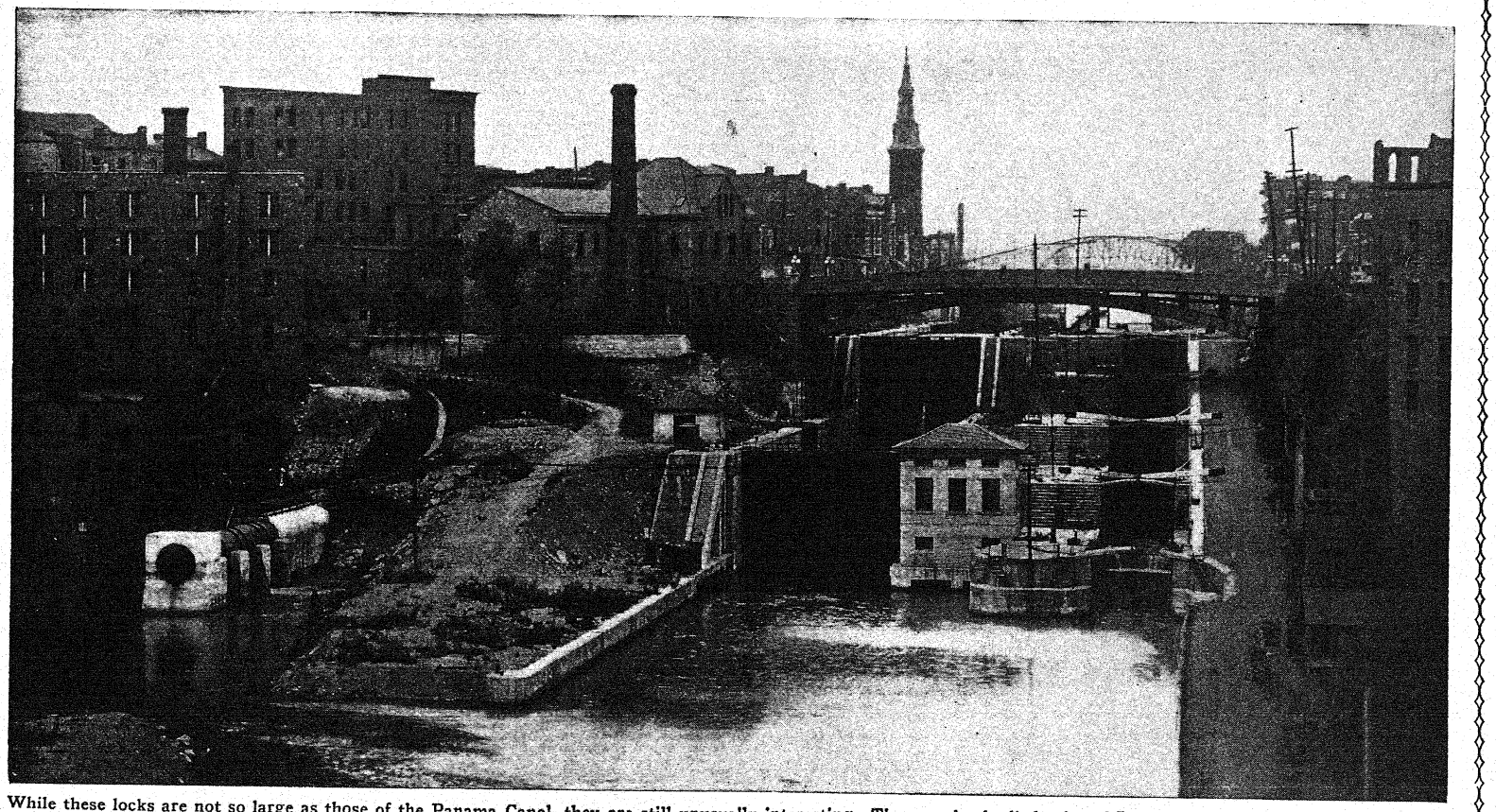
WHAT THE CANAL DID FOR NEW YORK CITY

For the business interests of New York it had done even more. In 1824, the year before traffic was opened along the whole canal, it cost $88 to send a ton of freight from Buffalo to Albany. Eleven years later; in 1835, it cost only three dollars. This meant that the people of New York and up and down the coast could get their bread so much cheaper. It also enabled the poor people of Europe to get their bread cheaper, for now vast quantities of wheat were shipped down the canal and exported to Europe. Over half of all the wheat exported from America to Europe came by this route. It was the Erie Canal which made New York the biggest business centre on the Atlantic Coast, the most important seaport in the country.

HOW THE CANAL HELPED THE STATE

With a navigable waterway traversing it, it was only natural that New York

THE GREAT LOCKS OF THE ERIE CANAL AT LOCKPORT



While these locks are not so large as those of the Panama Canal, they are still unusually interesting. They are in the little city of Lockport in western New York, where the land descends toward the level of Lake Erie. These, however, are not the largest on the canal. At Little Falls is the highest lock in the world, and at Waterford is a set of five, which together raise or lower the boats the immense distance of 184 feet. The total lift of the Panama locks is not half so much.

State should develop. What was once a wilderness, through which the early settlers had passed to reach the Great Lakes region, now became covered with prosperous farming communities. Even before the canal was completed the immigrants had arrived to lay out their homesteads, in anticipation of the produce they would be able to raise for the New York, Boston and Philadelphia markets.

Already while the canal was being dug there was talk of wagons that should run on iron rails, drawn by steam engines, and in 1831 a railroad was actually built from Albany to Schenectady, a distance of seventeen miles. Ten years later the railroad had been extended to Buffalo. But the railroads did not have any great effect on the traffic on the canal. For the reason that it costs so much to build and maintain railroads and freight cars, water transportation is, and always will be, cheaper.

THE CANAL WAS WIDENED AND DEEPENED

It is usually said that the Erie Canal was completed in 1825. But that is not quite true. It is not yet completed. Within ten years there was more freight than the canal barges could handle. Branches reaching out into other districts were continually being dug, until there were over a thousand miles of canal. Then the main canal was widened to 70 feet, so that barges large enough to carry eight thousand bushels of wheat could pass, instead of only one thousand bushels.

It was not long before the railroad companies began to show a bitter opposition toward the canal. Naturally, the canal forced them to keep down their freight rates. In every way they could they tried to impede any improvements on what they called the "ditch." Through their efforts a law was passed abolishing tolls. Apparently this would make freight rates cheaper on the canal. And so it did. But it also abolished the source of revenue from which improvements could be made. This obliged the legislature to appropriate special sums of money for the purpose. And this again raised a strong sentiment against the canal among those who did not benefit directly from it and felt they were being taxed for the good of those who lived along its route. The consequence was that the canal was neglected.

AGAIN THE CANAL WAS IMPROVED

But finally, in 1903, the people awoke to the realization that the railroads were opposed to the canal only for reasons of self-interest. And then amends were made for the many years of neglect. The people voted in favor of spending over one hundred million dollars to build what may be said to be a new canal, but a modern one, along which steamers may sail as they do up and down the Hudson. The new canal follows, for the most part, the line of the old, but many miles have been relocated for several different reasons.

The system of locks along the new Erie Canal surpasses even the Panama locks. In a dry, sloping pasture behind the little town of Waterford, the engineers have built what looks like a flight of giant steps, huge, concrete blocks, in each of which is one of five locks. Combined they will lift the freight steamers 184 feet, which is fourteen feet higher than all the Panama locks combined. At Little Falls, where the new channel of the canal ascends a narrow ravine, there is one lock, the highest in the world, which will lift the steamers something over forty feet in eight minutes, as though they were being hoisted by a giant derrick.

SOME WONDERFUL FEATURES OF THE WORK

Another wonderful feature is the great movable dams, big steel girders and steel plates riveted together, which are hinged on gigantic bridgelike structures. When navigation ceases in the winter these dams will be swung up so that the ice floes may sweep down unimpeded. There are eight of these great dams, and each cost $800,000.

The barges which are to take the place of the old horse-hauled craft are of 2000 to 3000-ton burden, compared to the 250-ton burden of the old barges. Some will be able to carry the contents of a freight train of seventy-five cars. That is the size of an average ocean-going freight steamer. And being propelled by their own power, these modern freight carriers will be able to carry their cargoes from Buffalo to New York two and a half times faster than did the old barges; the trip will be covered in a few days. Perhaps freight may be carried more quickly than it now is by train.

THE NEXT STORY OF THE UNITED STATES IS ON PAGE 5007.

A BORDER BALLAD BY SIR WALTER SCOTT

THE ballad is, of all forms of poetry, that best suited to the telling of a direct dramatic story. Sir Walter Scott, whose poems have the same romantic interest as his great novels, wrote a long romance in poetry entitled "Marmion: A Tale of Flodden Field." In the course of that long work several ballads are introduced. "Lochinvar" is one of these, and it is supposed to be sung by Lady Heron at Holyrood Palace, where King James is making merry, while Queen Margaret, at Linlithgow Castle, imagines he is engaged in battle against the English. The ballad is a very spirited love story of the kind we all admire, for Lochinvar, who snatched his true love away before the very eyes of the man to whom she was on the point of being married, is the ideal hero of romance. The scene of the story is the Scottish Borderland, and the idea was probably derived to some extent from an old ballad.

YOUNG LOCHINVAR

CONTINUED FROM 4722

OH, young Lochinvar is come out of the West!
Through all the wide Border his steed was the best;
And save his good broadsword he weapon had none;
He rode all unarm'd and he rode all alone.
So faithful in love, and so dauntless in war,
There never was knight like the young Lochinvar!

He stay'd not for brake and he stopp'd not for stone;
He swam the Eske river where ford there was none;
But ere he alighted at Netherby gate,
The bride had consented; the gallant came late;
For a laggard in love and a dastard in war,
Was to wed the fair Ellen of brave Lochinvar.

So boldly he enter'd the Netherby Hall,
'Mong bridesmen and kinsmen and brothers and all.
Then spake the bride's father, his hand on his sword,
For the poor craven bridegroom said never a word,
"Oh, come ye in peace here, or come ye in war,
Or to dance at our bridal, young Lord Lochinvar?"

"I long woo'd your daughter, my suit you denied;
Love swells like the Solway, but ebbs like its tide;
And now I am come with this lost love of mine
To lead but one measure, drink one cup of wine.
There are maidens in Scotland more lovely by far,
That would gladly be bride to the young Lochinvar!"

The bride kiss'd the goblet, the knight took it up,
He quaff'd off the wine and he threw down the cup;
She look'd down to blush, and she look'd up to sigh,
With a smile on her lips and a tear in her eye.
He took her soft hand ere her mother could bar;
"Now tread we a measure!" said young Lochinvar.

So stately his form, and so lovely her face,
That never a hall such a galliard did grace:
While her mother did fret and her father did fume,
And the bridegroom stood dangling his bonnet and plume;
And the bride-maidens whispered: "'Twere better by far
To have match'd our fair cousin with young Lochinvar!"

One touch to her hand and one word in her ear,
When they reach'd the hall-door; and the charger stood near;
So light to the croup the fair lady he swung,
So light to the saddle before her he sprung!
"She is won! We are gone, over bank, bush, and scaur,
They'll have fleet steeds that follow!" quoth young Lochinvar.

There was mounting 'mong Græmes of the Netherby clan;
Forsters, Fenwicks, and Musgraves, they rode and they ran;
There was racing and chasing on Cannobie Lea;
But the lost bride of Netherby ne'er did they see.
So daring in love, and so dauntless in war,
Have ye e'er heard of gallant like young Lochinvar?

THE MARSEILLAISE

This is one of the grandest songs of liberty that has ever been written. It is the national anthem of the French Republic. But it is something more, for wherever men are striving against oppression and striking for freedom, "The Marseillaise" is adopted as their hymn. It is indeed the anthem of liberty all the world over. It was originally written in French by Captain Rouget de Lisle, a French officer at Strasburg, in 1792, and was called "The Hymn of the Army of the Rhine," being written and set to music by the captain for the soldiers of the Rhine army to sing as they marched along. But because it was made known in Paris by the soldiers who came from Marseilles it was called "The Marseillaise," and has ever since borne that title. These soldiers from the south of France were the most enthusiastic fighters in the great days of the French Revolution, and as they adopted the song, which, with its stirring words and equally stirring music, had soon fired the hearts of the French people, it became the national anthem of the Republic.

YE sons of France, awake to glory,
Hark, hark, what myriads bid you rise,
Your children, wives, and grandsires hoary,
Behold their tears and hear their cries!
Shall hateful tyrants, mischief breeding,
With hireling hosts, a ruffian band,
Affright and desolate the land,
While peace and liberty lie bleeding?

Refrain.

To arms, to arms, ye brave!
Th' avenging sword unsheath!
March on, march on, all hearts resolved
To victory or death.

Now, now the dangerous storm is scowling
Which treacherous kings, confederate, raise;
The dogs of war, let loose, are howling,
And, lo! our fields and cities blaze.
And shall we basely view the ruin,
While lawless force, with guilty stride,
Spreads desolation far and wide,
With crimes and blood his hands embruing?

With luxury and pride surrounded,
The vile, insatiate despots dare,
Their thirst of power and gold unbounded,
To mete and vend the light and air;
Like beasts of burden would they load us,
Like gods would bid their slaves adore:
But man is man, and who is more?
Then, shall they longer lash and goad us?

O Liberty, can man resign thee!
Once having felt thy gen'rous flame?
Can dungeon, bolts, and bars confine thee,
Or whips thy noble spirit tame?
Too long the world has wept, bewailing
That falsehood's dagger tyrants wield;
But freedom is our sword and shield,
And all their arts are unavailing.

THE OWL

If we look back at page 2929, we shall find a song from Shakespeare beginning "When icicles hang by the wall," and it will be seen that Lord Tennyson in the following lines on the owl has to some extent modeled his verse on Shakespeare's.

WHEN cats run home and light is come,
And dew is cold upon the ground,
And the far-off stream is dumb,
And the whirring sail goes round,
And the whirring sail goes round;
Alone, and warming his five wits,
The white owl in the belfry sits.

When merry milkmaids click the latch,
And rarely smells the new-mown hay,
And the cock hath sung beneath the thatch
Twice or thrice his roundelay,
Twice or thrice his roundelay;
Alone, and warming his five wits,
The white owl in the belfry sits.

THE CROCUS

In the country the first hint that people get of the coming of spring is the appearance of the crocus in its gay dress. When the garden looks to the eye as if it were still under the power of winter, they are suddenly surprised to see a globe of gold, or purple, or white, light up the soil, and they know then that warmer spring days are at hand. The interesting stranger is the crocus, to which Mrs. Harriet E. King pays so true and fitting a tribute in her poem.

OUT of the frozen earth below,
Out of the melting of the snow,
No flower, but a film, I push to light;
No stem, no bud—yet I have burst
The bars of winter. I am the first,
O sun, to greet thee out of the night!

Bare are the branches, cold is the air,
Yet it is fire at the heart I bear,
I come, a flame that is fed by none:
The summer hath blossoms for her delight,
Thick and dewy and waxen-white.
Thou seest me golden, O golden sun!

Deep in the warm sleep underground
Life is still, and the peace profound:
Yet a beam that pierced, and a thrill that smote,
Call'd me and drew me from far away—
I rose, I came, to the open day.
I have won, unshelter'd, alone, remote.

No bee strays out to greet me at morn,
I shall die ere the butterfly is born,
I shall hear no note of the nightingale;
The swallow will come at the break of green,
He will never know that I have been
Before him here when the world was pale.

They will follow, the rose with the thorny stem,
The hyacinth stalk—soft airs for them;
They shall have strength, I have but love:
They shall not be tender as I—
Yet I fought here first, to bloom, to die,
To shine in his face who shines above.

O Glory of Heaven, O Ruler of Morn,
O Dream that shap'd me, and I was born
In thy likeness, starry, and flower of flame;
I lie on the earth, and to thee look up,
Into thy image will grow my cup,
Till a sunbeam dissolve it into the same.

UP-HILL

These impressive verses by Christina Rossetti are in praise of high endeavor. We are to set our faces to the up-hill journey of life, and, nothing daunted, press forward through the long day, assured of the great reward of rest at the end.

DOES the road wind up-hill all the way?
Yes to the very end.
Will the day's journey take the whole long day?
From morn to night, my friend.

But is there for the night a resting-place?
A roof for when the slow dark hours begin.
May not the darkness hide it from my face?
You cannot miss that inn.

Shall I meet other wayfarers at night?
Those who have gone before.
Then must I knock, or call when just in sight?
They will not keep you standing at that door.

Shall I find comfort, travel-sore and weak?
Of labour you shall find the sum.
Will there be beds for me and all who seek?
Yes, beds for all who come.

LOVE WILL FIND OUT THE WAY

OVER the mountains
And over the waves,
Under the fountains
And under the graves,
Under floods that are deepest
Which Neptune obey,
Over rocks that are steepest,
Love will find out the way.

Where there is no place
For the glow-worm to lie;
Where there is no space
For receipt of a fly;
Where the midge does not venture
Lest herself fast she lay,
If Love come, he will enter
And will find out the way.

OLD ENGLISH.

"SHIPS THAT PASS IN THE NIGHT"

SHIPS that pass in the night and speak each other in passing,
Only a signal shown and a distant voice in the darkness;
So on the ocean of life, we pass and speak one another,
Only a look and a voice, then darkness again and a silence.

HENRY WADSWORTH LONGFELLOW.

THE LESSON OF THE WATER MILL

We have already had the pleasure of reading, on page 2745, a fine poem by Miss Sarah Doudney. In the following poem she weaves a lesson around the old proverb, "The mill will never grind again with the water that is passed."

LISTEN to the water mill
Through the livelong day,
How the clicking of the wheel
Wears the hours away!
Languidly the autumn wind
Stirs the forest leaves;
From the field the reapers sing,
Binding up their sheaves.
And a proverb haunts my mind
As a spell is cast—
"The mill cannot grind
With the water that is past."

Autumn winds revive no more
Leaves that once are shed,
And the sickle cannot reap
Corn once gatherèd.
Flows the ruffled streamlet on,
Tranquil, deep, and still,
Never gliding back again,
To the water mill.
Truly speaks that proverb old,
With a meaning vast—
"The mill cannot grind
With the water that is past."

Take the lesson to thyself,
True and loving heart;
Golden youth is fleeting by,
Summer hours depart.
Learn to make the most of life,
Lose no happy day,
Time will never bring thee back
Chances swept away!
Leave no tender word unsaid,
Love while love shall last—
"The mill cannot grind
With the water that is past."

Work while yet the daylight shines,
Man of strength and will!
Never does the streamlet glide
Useless by the mill;
Wait not till to-morrow's sun
Beams upon thy way,
All that thou canst call thine own
Lies in thy "to-day."
Power, and intellect, and health
May not always last—
"The mill cannot grind
With the water that is past."

O the wasted hours of life
That have drifted by!
O the good that might have been,
Lost, without a sigh!
Love that we might once have saved
By a single word,
Thoughts conceived, but never penned,
Perishing unheard;
Take the proverb to thine heart,
Take, and hold it fast—
"The mill cannot grind
With the water that is past."

THE CRY OF THE DREAMER*

John Boyle O'Reilly was an Irish author who won distinction in America, where he died in 1890, at the early age of forty-six. He was a true poet, and one who hated the meaner aspects of modern life. In these fine verses this aspect of his character may be seen, for he was one of the dreamers who, by virtue of their serene and beautiful thoughts, can never die.

I AM tired of planning and toiling
In the crowded hives of men;
Heart weary of building and spoiling,
And spoiling and building again.
And I long for the dear old river,
Where I dreamed my youth away;
For a dreamer lives for ever
And a toiler dies in a day.

I am sick of the showy seeming
Of a life that is half a lie;
Of the faces lined with scheming
In the throng that hurries by.
From the sleepless thoughts' endeavor
I would go where the children play;
For a dreamer lives for ever,
And a toiler dies in a day.

I can feel no pride, but pity
For the burdens the rich endure;
There is nothing sweet in the city
But the patient lives of the poor.
Oh! the little hands too skilful,
And the child mind choked with weeds!
The daughter's heart grown wilful,
And the father's heart that bleeds!

No, no! From the street's rude bustle,
From trophies of mart and stage,
I would fly to the wood's low rustle
And the meadow's kindly page.
Let me dream as of old by the river,
And be loved for the dream alway;
For a dreamer lives for ever,
And a toiler dies in a day.

* By special permission of the publishers, The Bobbs-Merrill Co.

*THE BRAVEST BATTLE THAT EVER WAS FOUGHT

Joaquin Miller was one of the most picturesque figures in American literature. He was born in Indiana in 1841, and in his earlier life had many adventures, finally settling in California in 1887. He is the singer of the great lands of the West known as the Sierras, and most of his poetry suggests very effectively the splendid freedom and breadth of view of these great spaces of the mighty continent. In the piece we have chosen here, however, he sings in praise of the best of all heroines, the toiling mothers of our race.

THE bravest battle that ever was fought,
Shall I tell you where and when?
On the maps of the world you will find it not:
'Twas fought by the mothers of men.

Nay, not with cannon, or battle-shot,
With sword, or nobler pen;
Nay, not with eloquent word or thought,
From mouths of wonderful men.

But deep in a walled-up woman's heart—
Of woman that would not yield,
But bravely, silently bore her part—
Lo! there is that battle-field!

No marshalling troop, no bivouac song;
No banners to gleam and wave!
But oh! these battles they last so long—
From babyhood to the grave!

Yet faithful still as a bridge of stars,
She fights in her walled-up town—
Fights on, and on, in the endless wars,
Then silent, unseen goes down!

Oh! ye with banners and battle-shot,
And soldier to shout and praise,
I tell you the kingliest victories fought
Are fought in these silent ways!

Oh! spotless woman in a world of shame,
With splendid and silent scorn,
Go back to God as white as you came,
The kingliest warrior born.

A DEED AND A WORD

Dr. Charles Mackay sings an old, old song in these verses,—an old song that is ever new, for the lessons of mercy and kindly consideration to our fellows need ever to be read to us, lest in too much thought of ourselves we forget how we may help others by some kind action which is free from all self-interest.

A LITTLE stream had lost its way
Amid the grass and fern;
A passing stranger scooped a well,
Where weary men might turn.
He walled it in, and hung with care
A ladle at the brink;
He thought not of the deed he did,
But judged that all might drink.
He passed again, and lo! the well,
By summer never dried,
Had cooled ten thousand parching tongues,
And saved a life beside.

A nameless man amid a crowd
That thronged the daily mart,
Let fall a word of hope and love,
Unstudied, from the heart;
A whisper on the tumult thrown,
A transitory breath—
It raised a brother from the dust,
It saved a soul from death.
O germ! O fount! O word of love!
O thought at random cast!
Ye were but little at the first,
But mighty at the last.

A MAN'S A MAN FOR A' THAT

Few of the songs of Robert Burns are more popular than this, although so many of its words are unfamiliar to American readers. It is a great lyric in praise of the honest poor man, who is not ashamed of being poor, and apes not the manners of those who are better provided with worldly goods. It is a wholesome reminder to us that titles and dignities are no more than artificial distinctions, and it is the man himself, by his own character and his own deeds, who can prove himself worthy or unworthy of the honor and esteem of his fellow-men. There is a piece of gold, which represents the character of a good man, and there is a guinea which has been stamped out of gold; this is all the difference that rank and title can make. 'The man is the gold for all that," to put the words of the poet into English.

IS there, for honest poverty,
That hangs his head, and a' that?
The coward-slave, we pass him by,
And dare be poor, for a' that!
For a' that, and a' that,
Our toils obscure, and a' that,
The rank is but the guinea's stamp;
The man's the gowd for a' that.

What tho' on hamely fare we dine,
Wear hodden-gray, and a' that;
Gie fools their silks, and knaves their wine,
A man's a man for a' that.
For a' that, and a' that,
Their tinsel show, and a' that,
The honest man, tho' ne'er sae poor,
Is king o' men for a' that.

Ye see yon birkie, ca'ed a lord,
Wha struts, and stares, and a' that;
Tho' hundreds worship at his word,
He's but a coof for a' that.
For a' that, and a' that,
His riband, star, and a' that,
The man of independent mind,
He looks and laughs at a' that.

A king can mak a belted knight,
A marquis, duke, and a' that;
But an honest man's aboon his might,
Guid faith, he maunna fa' that!
For a' that, and a' that,
Their dignities, and a' that,
The pith o' sense, and pride o' worth,
Are higher rank than a' that.

Then let us pray that come it may,
As come it will for a' that,
That sense and worth, o'er a' the earth,
May bear the gree, and a' that.
For a' that, and a' that,
It's coming yet, for a' that,
When man to man, the warld o'er,
Shall brothers be for a' that.

FINIS

"Finis" is a Latin word, and means "end." The thoughts uttered in these four lines, therefore, are Walter Savage Landor's summing up of his career. He strikes a note of strength, of intense confidence in himself; but a selfish note is not wholly pleasant. His devotion to Nature and art, however, excuse much. His pride deceived him, too, for he was almost a born fighter, whether his opponents or the causes for which they stood were worthy of his strife or not. The picture of the old man warming both hands at life's fire and being then ready to go to his long sleep is ranked among the greatest strokes of imagination in English poetry.

I STROVE with none, for none was worth my strife.
Nature I loved, and next to Nature, art.
I warm'd both hands before the fire of life;
It sinks, and I am ready to depart.

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SHOCK-HEADED PETER

HALF a century or more ago there were not many amusing books for children, and a German physician, Dr. Hoffman, being unable to find the kind of volume he wanted for his little boy, bought a plain notebook, and from time to time wrote short rhymes in the pages and drew little pictures to illustrate them. The rhymes were mostly about disobedient and foolish boys and girls, but they greatly pleased Dr. Hoffman's little son and delighted even grown-up people, who persuaded the doctor to publish them. These amusing rhymes, beginning with that of "Shock-headed Peter," became very popular, and have now been translated into nearly every European language. A selection of Dr. Hoffman's verses is given on these pages.

SHOCK-HEADED PETER

BEHOLD Shock-headed Peter,
This dreadful-looking creature!



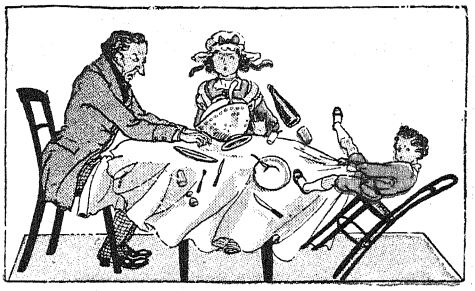
He wouldn't let them cut his hair,
Or nails from off his fingers pare,
For nigh the span of one full year.
His friends, whene'er his name they hear,
Cry: "Ugh! You dirty creature!
Horrid Shock-headed Peter!"

THE STORY OF FIDGETY PHILIP

"I OFTEN wonder if our Phil
Will learn at table to sit still?"
His father's voice was very grave,
As he warned him to behave.



His mother looked with silent gaze
Around the table in amaze.
Philip no attention paid
To what his loving father said.
He wriggled and jiggled,
He see-sawed and he-hawed,
Forward and backward he tilted his seat·
"Stop it, Philip, I do entreat!"
See him on his chair just hang,
Soon he'll go down with a bang.
The chair will slip with Philip's weight,
Because the see-saws are too great.



Back goes his chair and down he falls,
It mattered not his frightened squalls.
Nothing can his fall prevent,
But, snatching at the cloth, he sent
Flying every dish and plate.
His father's wrath was very great,
And his mother mutely gazed
Round the table quite amazed.
Phil has gone down with his chair,
The table's left quite clear and bare.
Not a scrap is left to eat.
Soup, potatoes, bread, and meat,
Every glass and dish and bowl,
Wildly on the floor did roll.

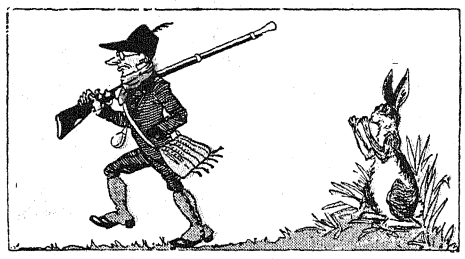


Father Jackson and his wife
Never saw in all their life
Such a mess as this before.
They looked with wonder at the floor,
Where, destroyed, lay all their food,
And their tempers were not good.

THE HUNTER AND THE HARE

ONE hot summer day a hunter went out,
For big game and little in green fields to scout;
With powder-horn, game-bag, and very long gun,
He walked in his grassy green coat in the sun.

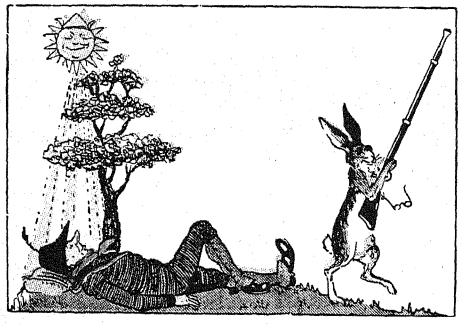
Placing his spectacles straight on his nose,
"I'll just shoot a hare," he says as he goes.
A little hare sat in his house cool and green,
And laughed as the hunter passed by him unseen.



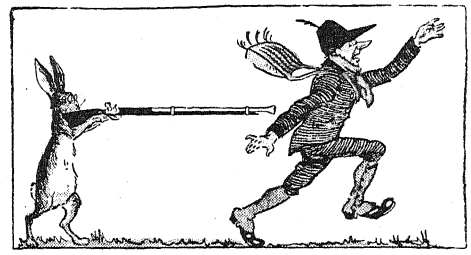
The air was so hot, and so dusty the road,
The gun to the hunter seemed quite a big load,
So wearily down on the flat of his back,
He lay and went off to sleep in a crack.

As soon as he thought the hunter asleep,
The little hare to him softly did creep
He took the man's gun and his glasses away,
Then quickly ran off, saying: "No need to stay."

The glasses he put upon his own nose,
And said: "I see much better now, I suppose."

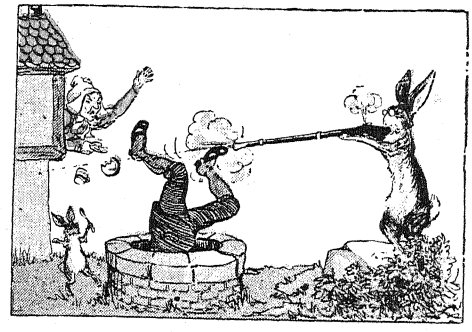


He raised the long gun, aimed at the coat green,
But ere he could fire, by the hunter was seen.



The hunter jumped up and shouted, dismayed:
"Oh, help me, dear people, I'm dead, I'm afraid!"
He ran for dear life, no man heard his yell;
Chased close by the hare, he jumped into a well.

The little hare fired, and bang went the gun.
He misses his aim, but what has he done?
The hunter's young wife at the house window sat,
Enjoying her tea with her favourite cat.



She raised to her lips the tea for to sup,
When whizz came the bullet—in two broke the cup.
And just at this moment, without fear or care,
Under the window danced another small hare.

On him dropped the tea—the picture it shows,
Drenching his ears, and his eyes, and his nose.
Affrighted he leaps. "What burns me?" he said,
And when last was seen whirled the spoon round his head.

THE STORY OF A BLACKAMOOR

HERE in this picture you can see
A Moor, as black as coal is he.

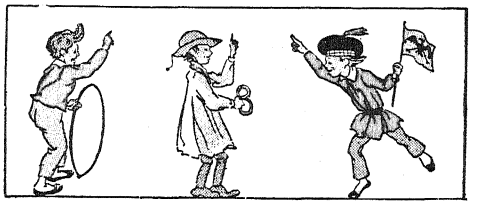


With his umbrella he one day
Went walking, feeling bright and gay.

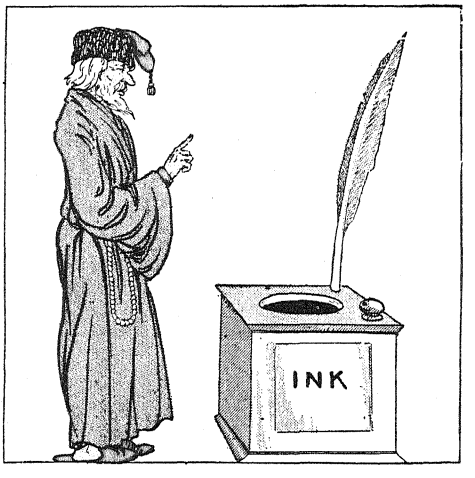
Too soon his troubles were begun,
So very hot did shine the sun,
So his uncovered curly head
He shaded with umbrella red.

Then up came Jack, toys in his hand,
To watch the Moor stride on the sand.
Tom brought a hoop, and Will at last
With his new flag came running fast.

They screamed and laughed—yes, all the three,
When that poor nigger they did see;
Because as black as soot was he.



Just then passed by—whom do you think?—
All laden with a pot of ink,
None other than good Santa Claus;
He saw how bad their purpose was.



He called out in an angry tone:
"Boys, leave the blackamoor alone.
For if he tries with all his might
He cannot change from black to white."

But those three boys were not polite,
They laughed and mocked with all their might;
And sneered more even than before
About that little blackamoor.



Then Santa Claus did interfere,
He was so cross! You see it here.
He seized them; little did he care
Whether by arms, or legs, or hair.

Right into the ink-pot he put Will,
Bad Jack, and Tom; they kept not still.
When Santa held them very tight,
They kicked and yelled with all their might.

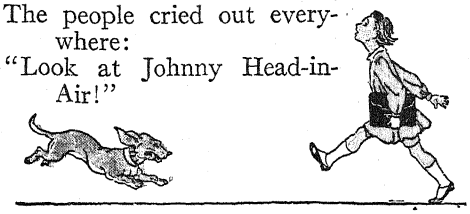
The good saint dipped them in a wink
Right in that bottle of black ink.
And here the boys—their hearts are sore—
Are blacker than the blackamoor.

The nigger boy in front you see
Followed by the unlucky three.
If they had kept their sneering back,
They never would have been turned black.

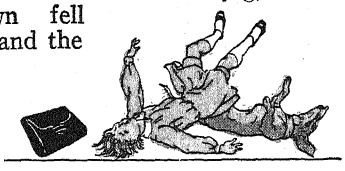


JOHNNY HEAD-IN-AIR

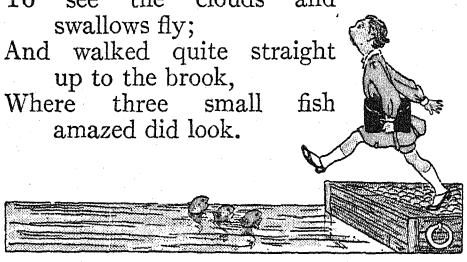
AS he trudged along to school,
It was always Johnny's rule
To be looking at the sky
And the clouds that floated by.
The people cried out everywhere:
"Look at Johnny Head-in-Air!"



Whene'er a dog came running by,
Still Johnny watched the birds on high.
No one cried: "Now mind your nose,
A little dog's beneath your toes!"
Alack! Alack! there came a jog,
And down fell Johnny and the dog.



One day he wandered near a brook,
Holding in one hand a book;
He stared, and stared up to the sky,
To see the clouds and swallows fly;
And walked quite straight up to the brook,
Where three small fish amazed did look.

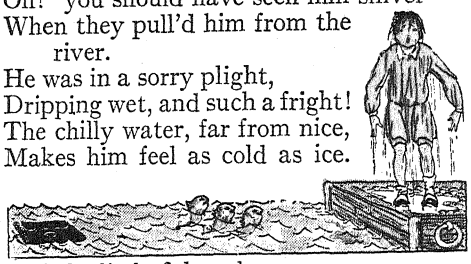


Just one more step, then in a flash
In he tumbled with a splash!
Three small fishes, all afraid,
For their hiding-places made.

Two strong men, each with a hook,
Were standing near that little brook;
They fished him out, all wet, alas!
And laid him on the cool, green grass.



Oh! you should have seen him shiver
When they pull'd him from the river.
He was in a sorry plight,
Dripping wet, and such a fright!
The chilly water, far from nice,
Makes him feel as cold as ice.



And the little fishes three,
Swim about all full of glee;
They laugh and jeer with all their might
To see poor Johnny's sorry plight.
They laugh, and laugh the livelong day
While Johnny's book floats far away.

THE STORY OF FLYING ROBERT

WHEN 'tis pouring hard with rain,
When the storm howls o'er the plain,
Boys and girls are very wise
If they wait for fairer skies.



"I won't wait," daft Robert cried,
"Great must be the fun outside."
With his sunshade he went out,
O'er the fields to roam about.

Now the wind swift onward goes—
Notice how the trees it blows—
Robert's sunshade, flaunting there,
Up is whisked into the air.



Robert, too, goes up withal
Where no ear can catch his call.
Upwards, onwards, he must rush,
Off his hat goes with a gush.

Robert and umbrella fly
Through the clouds up to the sky,
No man in the world can tell
When they stopped or when they fell;
Only this one thing is plain,
Rob was never seen again.



RIP VAN WINKLE

HIS STRANGE ADVENTURE IN THE MOUNTAINS

CONTINUED FROM 4688

WHOEVER makes a voyage up the Hudson River will see the famous Catskill Mountains, that are a branch of a still greater range stretching away to the west of the river, swelling up to a noble height, and lording it over the surrounding country. Every change of season, every change of weather, indeed, every hour of the day, produces some change in the magical hues and shapes of these mountains, and they are regarded by all the good wives, far and near, as perfect barometers.

When the weather is quite fair and settled, they are clothed in blue and purple, and print their bold outlines on the clear evening sky; but sometimes, when the rest of the landscape is cloudless, they gather a hood of grey vapors about their summits, which, in the last rays of the setting sun, glow and light up like a crown of glory.

In a tiny village at the foot of these fairy mountains there lived many years ago a simple, good-natured fellow of the name of Rip Van Winkle. He was a kind neighbor and an obedient husband, and was a general favorite. The children would shout with joy whenever he approached. He assisted at their sports, made their little playthings, taught them to fly kites and to shoot marbles, and told them long stories of ghosts, witches, and Indians. Whenever he went roaming about the village he was surrounded by a troop of boys and girls hanging on his skirts, clambering on his back, and playing a thousand tricks on him with impunity, and not a dog would bark at him throughout the neighborhood.

The great failure in Rip's character was a very great dislike to all kinds of profitable labor. It could not have been from the want of application or perseverance, for he would sit on a wet rock, with a rod as long and heavy as a Tartar's lance, and fish all day without a murmur, even though he should not be encouraged by a single nibble. He would carry a gun on his shoulder for hours together, trudging through woods and swamps, and up hill and down dale, to shoot a few squirrels or wild pigeons.

He would never refuse to assist a neighbor even in the roughest toil, and was a foremost man at all country frolics for husking Indian corn or building stone fences; the women of the village, too, used to employ him to run their errands, and to do such little odd jobs as their less

obliging husbands would not do for them. In a word, Rip was ready to attend to anybody's business but his own; but as to doing family duty, and keeping his farm in order, he found it impossible.

In fact, he declared it was of no use to work on his farm; it was the most unprofitable little piece of ground in the whole country; everything about it went wrong, and would go wrong, in spite of him. His fences were continually falling to pieces; his cow would either go astray or get among the cabbages; weeds were sure to grow quicker in his fields than anywhere else; the rain always made a point of setting in just as he had some outdoor work to do; so that though his estate had dwindled away, acre by acre, under his management, until there was little more left than a mere patch of Indian corn and potatoes, yet it was the worst-conditioned farm in the neighborhood.

His children, too, were as ragged and wild as if they belonged to nobody. His son Rip promised to inherit the habits with the old clothes of his father. He was generally seen trooping like a colt at his mother's heels, equipped in a pair of his father's cast-off breeches, which he had much difficulty in holding up with one hand, as a fine lady does her train in bad weather.

Rip Van Winkle, however, was one of those happy mortals who take the world easily, eat white bread or brown, whichever can be got with least thought or trouble, and would rather starve on a penny than work for a dollar. If left to himself, he would have whistled life away in perfect contentment; but his wife kept continually shouting in his ears about his idleness, his carelessness, and the ruin he was bringing on his family.

Rip's sole domestic friend was his dog Wolf, who was as much henpecked as his master; for Dame Van Winkle regarded them as companions in idleness, and even looked upon Wolf with an evil eye as the cause of his master going so often astray.

Times grew worse and worse with Rip Van Winkle as the years rolled on. A tart temper never mellows with age, and a sharp tongue is the only edged tool that grows keener with constant use. For a long while he used to console himself, when driven from home, by frequenting a kind of club of the sages, philosophers, and other idle people of the village, which held its sessions on a bench before a small inn, that had for its sign a ruddy portrait of his Majesty King George the Third.

The opinions of this little band were completely controlled by Nicholas Vedder, a patriarch of the village, and landlord of the inn, at the door of which he took his seat from morning till night, just moving sufficiently to avoid the sun and keep in the shade of a large tree, so that the neighbors could tell the hour by his movements as accurately as by a sun-dial. It is true he was rarely heard to speak, but smoked his pipe incessantly. His friends, however, perfectly understood him, and knew how to gather his opinions.

When anything that was read or related displeased him, he was observed to smoke vehemently, and to send forth short, frequent, and angry puffs; but when pleased he would inhale the smoke slowly and tranquilly, and emit it in light and placid clouds; and sometimes, taking the pipe from his mouth and letting the fragrant vapor curl about his nose, would gravely nod his head in token of perfect approbation.

From even this stronghold the unlucky Rip was at length routed by his nagging wife, who would suddenly break in upon the tranquillity of the assemblage and abuse the members for their laziness. Nor was that august personage, Nicholas Vedder himself, sacred from the daring tongue of this terrible woman, who charged him outright with encouraging her husband in his habits of idleness.

Poor Rip was at last reduced almost to despair, and his only alternative to escape from the labor of the farm and clamor of his wife was to take gun in hand and stroll away into the woods. Here he would sometimes seat himself at the foot of a tree and share the contents of his wallet with Wolf, with whom he sympathized as a fellow-sufferer in persecution.

In a long ramble of the kind, on a fine autumnal day, Rip had unconsciously scrambled to one of the highest parts of the Catskill Mountains. He was after his favorite sport of squirrel-shooting, and the still solitudes had echoed and re-echoed with the reports of his gun. Panting and fatigued, he threw himself,



Rip Van Winkle saw a strange figure slowly toiling up the rocks, and bending under the weight of something he carried on his back. He was surprised to see any human being in this lonely and unfrequented place.

late in the afternoon, on a green knoll covered with mountain herbage that crowned the brow of a precipice. From an opening between the trees he could overlook all the lower country for many a mile of rich woodland. He saw at a distance the lordly Hudson far, far below him, moving on its silent, majestic course, with the reflection of a purple cloud, or the sail of a lagging bark, here and there sleeping on its glassy bosom, and at last losing itself in the blue highlands.

For some time Rip lay musing on this scene; evening was gradually advancing; the mountains began to throw their long, blue shadows over the valleys; he saw that it would be dark long before he could reach the village, and he heaved a heavy sigh when he thought of encountering the terrors of Dame Van Winkle.

As he was about to descend, he heard a voice from a distance hallooing: "Rip Van Winkle! Rip Van Winkle!" He looked round, but could see nothing but a crow winging its solitary flight across the mountain. He thought his fancy must have deceived him, and turned again to descend, when he heard the same cry ring through the still evening air: "Rip Van Winkle! Rip Van Winkle!" At the same time Wolf bristled up his back, and, giving a loud growl, skulked to his master's side, looking fearfully down into the glen.

Rip now felt a vague dread stealing over him; he looked anxiously in the same direction, and perceived a strange figure slowly toiling up the rocks, and bending under the weight of something he carried on his back. He was surprised to see any human being in this lonely and unfrequented place; but supposing it to be someone of the neighborhood in need of his assistance, he hastened down to help.

On nearer approach, he was still more surprised at the singularity of the stranger's appearance. He was a short, squarely-built old fellow, with thick, bushy hair and a grizzled beard. His dress was of the antique Dutch fashion —a cloth jerkin strapped round the waist; several pairs of breeches, the outer one of ample volume, decorated with rows of buttons down the sides, and bunches of ribbon at the knees. He bore on his shoulder a stout keg that seemed full of liquor, and made

signs for Rip to approach and assist him with the load. Though rather shy and distrustful of this new acquaintance, Rip complied with his usual alacrity, and, mutually assisting each other, they clambered up a narrow gully, apparently the dry bed of a mountain torrent.

As they ascended, Rip every now and then heard long, rolling peals, like distant thunder, that seemed to issue out of a deep ravine, or cleft, between lofty rocks, toward which their rugged path conducted. He paused for an instant, but, supposing it to be the muttering of one of those fitful thunder-showers which often take place in mountain heights, he proceeded.

Passing through the ravine, they came to a hollow, like a small amphitheatre, surrounded by perpendicular precipices, over the brinks of which tall trees shot their branches, so that they only caught glimpses of the azure sky and the bright evening cloud. During the whole time Rip and his companion had labored on in silence, for though the former marveled greatly what could be the object of carrying a keg of liquor up this wild mountain, yet there was something strange about the unknown that inspired awe and checked familiarity. On entering the amphitheatre, new objects of wonder presented themselves. On a level spot in the centre was a company of odd-looking old men playing at ninepins. They were dressed in a quaint, outlandish fashion—some wore short doublets, others jerkins, with long knives in their belts, and most of them had enormous breeches, of similar style to that of the guide's.

Their visages, too, were peculiar—one had a large head, broad face, and small, piggish eyes; the face of another seemed to consist entirely of nose, and was surmounted by a black sugar-loaf hat, set off with a little red cock's tail. They all had beards of various shapes and colors.

There was one who seemed to be the commander. He was a stout old gentleman, with a weather-beaten countenance; he wore a lace doublet, broad belt and hanger, high-crowned hat and feather, red stockings, and high-heeled shoes, with roses in them.

The whole group reminded Rip very much of the figures in an old Flemish painting that he had seen in the parlor of Dominie Van Shaick, the village parson,



On entering the amphitheatre, new objects of wonder presented themselves to Rip Van Winkle. On a level spot in the centre was a company of odd-looking men, dressed in an old fashioned manner playing ninepins.

and which had been brought over from Holland at the time of the settlement.

What seemed particularly odd to Rip was, that though these folks were evidently amusing themselves, yet they maintained the gravest faces, the most mysterious silence, and were, withal, the most melancholy party of pleasure he had ever witnessed. Nothing interrupted the stillness of the scene but the noise of the balls, which, whenever they were rolled, echoed along the mountains like rumbling thunder.

As Rip and his companion approached them, they suddenly stopped their play, and stared at him with such fixed, statue-like gaze, and such strange, uncouth countenances, that his heart turned within him and his knees smote together. His companion now emptied the contents of the keg into large flagons, and made signs to him to wait upon the company. He obeyed with fear and trembling; they drank the liquor in profound silence, and then they returned to their game.

By degrees Rip's awe and fear subsided. He even ventured, when no eye was fixed upon him, to taste the beverage, which he found very good. He was naturally a thirsty soul, and was soon tempted to repeat the draught. One taste provoked another, and he repeated his visits to the flagon so often that at length his senses were overpowered, his eyes swam in his head, his head gradually declined, and he fell into a deep sleep.

On waking, he found himself on the green knoll whence he had first seen the old man of the glen. He rubbed his eyes—it was a bright, sunny morning. The birds were hopping and twittering among the bushes, and the eagle was wheeling aloft and breasting the pure mountain breeze. "Surely," thought Rip, "I have not slept here all night." He recalled the occurrences before he fell asleep—the strange man with a keg of liquor; the mountain ravine; the wild retreat among the rocks; the woe-begone party at ninepins; the flagon.

"Oh, that wicked flagon!" thought Rip. "What excuse shall I make to Dame Van Winkle?"

He looked round for his gun, but in place of the clean, well-oiled weapon he found an old firelock lying by him, the barrel encrusted with rust, the lock falling off, and the stock worm-eaten. He now suspected that the grave men of the mountain had played a trick upon him, and, having dosed him with liquor, had robbed him of his gun. Wolf, too, had disappeared, but he might have strayed away after a squirrel or partridge. He whistled after him and shouted his name, but all in vain.

He determined to revisit the scene of the last evening's gambol, and if he met with any of the party, to demand his dog and gun. As he rose to walk, he found himself stiff in the joints and wanting in his usual activity. "These mountain beds do not agree with me," thought Rip, "and if this frolic should lay me up with a touch of rheumatism, I shall have a bad time with Dame Van Winkle." With some difficulty he got down into the glen: he found the gully up which he and his companion had ascended the preceding evening; but, to his astonishment a mountain stream was now foaming down it, leaping from rock to rock and filling the glen with babbling murmurs. He, however, tried to scramble up its sides, working his toilsome way through thickets of birch and witch-hazel, and sometimes tripped over the wild grape-vines that twisted their tendrils from tree to tree, and spread a kind of network in his path.

At length he reached the place where the ravine had opened through the cliffs to the amphitheatre; but no traces of such opening remained. The rocks presented a high, impenetrable wall, over which the torrent came tumbling in a sheet of feathery foam, and fell into a broad, deep basin, black from the shadows of the surrounding forest. Here, then, poor Rip was brought to a stand. He again called and whistled after his dog; he was only answered by the cawing of a flock of idle crows above him. What was to be done? The morning was passing away, and Rip felt famished for want of his breakfast. He grieved to give up his dog and his gun; he dreaded to meet his wife; but it would not do to starve among the mountains. He shook his head, shouldered his rusty firelock, and turned his steps towards his distant home. What happened to him afterwards is told in the continuation of this story on page 4861.

THE TALE OF BOB SINGLETON

TOLD AGAIN FROM THE FAMOUS BOOK BY THE AUTHOR OF ROBINSON CRUSOE

"WHY do you always come to stay at this little village of Islington after each of your voyages, Captain Singleton?" said the innkeeper's pretty daughter, Mary. "You have no friends here, that I can see. For those gipsies and beggar women that you are always talking to are not your friends, surely?"

"No, they are not my friends, Mary," said the captain—a fine, tall man, with bronzed face and blue eyes. "They're my enemies, in a way of speaking. Get me another mug of cider, lass, and I will tell you the story of my life, if you care to hear it."

Mary was very eager to hear it. For about fifteen years the captain had always come to the inn at Islington after a voyage, and nobody could make out how it was that the place attracted the lonely, thoughtful sailor. Mary, a sweet and simple girl of eighteen, brought in the cider, and sat down on a chair beside the captain, who lighted his pipe and puffed it thoughtfully, and then began his tale:

"Bob Singleton is not my real name. I cannot tell you, Mary, what my real name is, and I do not know where I was born. But I think it must have been 1680 when I came into the world. That would make me now forty years of age."

"Oh, you don't look as old as that!" said Mary.

"There's nothing like seafaring," said Singleton, "to keep a man young-looking and healthy. But to go on with my yarn. My parents must have been rich, whoever they were; for when I was a little boy about two years old I had a nurse-maid to look after me. One summer evening she brought me to these fields of Islington for a walk, and met a young man, who was her sweetheart. They went into an inn—no doubt this very place—and sat down to supper, leaving me playing outside the door.

"As I was running gaily about the fields, tumbling in the grass and plucking flowers, a gipsy woman came by, and, snatching me up in her arms, she ran away with me to London. There I was sold for twelve shillings to a beggar woman, who wanted a pretty child to take about with her to excite the pity of the people she begged from."

"That is why you are always going among the gipsies," said Mary. "You want to find the woman who stole you, and see if she can tell you anything of your parents?"

Captain Singleton nodded.

"She was a good creature in her way, that beggar woman," he continued. "She treated me very kindly, and never let me want for anything, and I must have wandered all over England with her.

"I used to think she was my real mother. It was not until she fell ill that she told me how I had been stolen by a gipsy, and sold for twelve shillings. Unhappily, she did not know anything about my true parents, and when she died, at Bussleton, a place near Southampton, I was left alone in the world without shelter, food, or friend.

"At this time I was a lad of about twelve years old, dressed in miserable rags, and I dare say very lean and hungry-looking. There are good people in this world, Mary, as well as bad. A master of a ship happened to see me begging in the street, and, taking pity on me, he carried me to sea with him to Newfoundland.

"You may be sure that I worked my hardest to please my kind master. I went on four voyages with him, and, what with good treatment and good exercise, I was at the age of fifteen as strong and as sturdy a lad of my years as you could wish to see. But as we were coming home from the banks of Newfoundland our vessel was captured by a Moorish pirate ship."

"Was there a fight?" said Mary.

"Yes," replied the captain, "and my poor master was badly wounded; but the Moors took care of me, though I could not guess why at the time. I can now see that, as I was then a fine, strapping lad, I should have fetched a high price as a slave. By good luck, however, I did not reach the slave market The Moors took our ship in tow, and sailed

away with it to Algiers. But in the Bay of Cadiz the pirate ship was attacked by two great Portuguese men-of-war, and taken and carried into Lisbon."

"You were fortunate to be rescued from the wicked Moorish pirates," said Mary.

"It was not much of a rescue for me," said Captain Singleton sadly. "My master died of his wounds at Lisbon, and I then found myself there in a worse position than I had been in at Bussleton. Not only was I houseless and starving, but I was in a foreign country, and could not speak a word of their language.

"I had one good friend, however, and that was my old master's ship dog. It used to steal meat and bring it to me, and with this food I managed for some time to keep body and soul together. At last, having acquired a smattering of the Portuguese tongue, I shipped as a sailorman on a great galleon bound for the East Indies."

"But why didn't you try to return to England?" exclaimed Mary.

"I wanted to see the world," said Captain Singleton. "Besides, I had no friends to go to in England, or anywhere else. But I saw more of the world when I left Lisbon than I bargained for. I never got to the East Indies, for the Portuguese crew mutinied and obtained command of the ship, and wrecked it in trying to enter a bay on the coast of Mozambique, where they meant to set up as pirates.

"Mozambique is on the east coast of Africa, opposite Madagascar," continued Captain Singleton, "and it is peopled by savage negroes. Running into the bay was a river about as broad as the Thames at Gravesend. We filled our small boats with plenty of provisions and fire-arms, and sailed and rowed up this river nearly two hundred miles till we came to a great waterfall. Then we landed and divided our powder and shot, which were our means of getting food, and set out on a march of two thousand miles, right across the unknown continent."

"How terrible that must have been!" cried Mary.

"It was very terrible," replied Captain Singleton. "Sometimes the natives gathered in great numbers to oppose us, and it was only because they had never heard a gun go off, and were frightened by the noise, that they let us pass. We nearly perished from thirst in a great desert, and we had to waste a great deal of our precious gunpowder in defending ourselves against savage beasts.

"All our troubles and discomforts, however, were forgotten when we came to a great river which, as we afterwards found, ran to a Dutch settlement on the Gold Coast. For the sand on the shore of the river was full of gold. We stayed there three months washing the gold out of the gravel, and when we had each gathered about five hundred pounds' worth of this precious metal, we made a raft and floated in eleven days down to the Dutch settlement, and there I and the Portuguese parted. I went away to Cape Coast Castle, where I got a passage for England, and with my gold, Mary, I bought a fine ship of my own, which I still have."

"You have had an extremely adventurous life," said Mary, with a sweet smile, "and you have, no doubt, made a great deal of money. But why do you always seem so unhappy, Captain Singleton?"

"That is because I am very lonely," said the captain, taking her hand. "Mary, dear, I have given up looking for parents, for I know now that I have found all that I want to make me happy."

"What is that?" said Mary.

Everybody in Islington saw what it was three weeks later, when Captain Singleton and Mary were married in the fine old village church.

THE MILK THAT SPRANG INTO LIFE

WHEN Hercules was a baby, the chief of the gods, Jupiter, wished to make him immortal, and therefore placed him where he could obtain the divine milk that should make him live for ever.

The little Hercules was over-anxious to get this wonderful food, and in his eagerness spilt some of it upon the earth, where the drops at once sprang up into life as the beautiful lily, the symbol of all that is pure and true and good in life. When Hercules grew up he performed the twelve great labors about which we read elsewhere in this book.

ANDROCLES AND THE LION

ANDROCLES was a poor Roman slave who was carried away to Northern Africa many hundreds of years ago. His life was very hard and painful, and his master was a very cruel man. At last he resolved that he would try to escape to the sea-coast, and get back to Rome.

He knew that if he were caught he would be put to death; so he waited till the nights were dark and moonless, and then he crept out of his master's house and stole through the town, and got into the open country.

On and on he hastened through the darkness as fast as his legs would carry him. But when the day broke he found that, instead of making towards the sea-coast, he had struck into the great lonely desert. He was tired out, hungry, and thirsty, and seeing a cave in the side of some cliffs, he crept into it, lay down, and very soon fell into a gentle sleep. Suddenly he was awakened by a terrible roaring, and, starting to his feet, he beheld a huge tawny lion standing at the entrance to the cave. Androcles had been sleeping in its den. He could not escape; the great lion barred the way. Utterly terror-stricken, he waited for the great beast to spring upon him and kill him.

But the lion did not move. It moaned and licked one of its paws, from which blood was flowing. Seeing that the animal was in great pain, Androcles forgot his terror, and came forward, and the lion held up its paw, as if it were asking Androcles for help.



ANDROCLES DREW THE GREAT THORN OUT OF THE LION'S PAW WITH A QUICK MOVEMENT

Androcles then perceived that a great thorn had got into the paw, and cut it, and made it swell. He drew the thorn out with a quick movement, and then pressed the swelling and stopped the flow of blood.

Relieved of the pain, the grateful lion limped out of the cave, and in a few minutes it returned with a dead rabbit,

which it laid beside Androcles. When the poor slave had cooked and eaten the rabbit, the lion led him to a place in the cliffs where there was a spring of fresh water gushing from the earth.

For three years the man and the lion lived in the cave. They hunted together and slept together, and the great, shaggy, affectionate creature used to lie down at night at Androcles' feet, and slowly wag his huge bushy tail from side to side, as a cat does when it lies before the fire and feels happy and comfortable.

But at last Androcles began to weary for the society of his fellow-men. So he left the lion's cave, but he was soon caught by some soldiers and sent as a fugitive slave to Rome. The ancient Romans were very cruel to runaway slaves, and they sentenced Androcles to be killed by wild beasts in the arena on the first public holiday.

A vast multitude of spectators came to see the pitiful sight, and among them was the Emperor of Rome, who sat on a high seat above the arena, surrounded by his senators. Androcles was pushed into the great open space, and a lance was thrust into his hand. With this, he was told, he would have to defend himself against a powerful lion which had been kept for days without food to make it savage and fierce. The poor man was given a chance of surviving; but, as he knew, it was a very, very poor chance.

He trembled when the hungry lion sprang out of its cage with a terrible roar, and the lance shook in his feeble grasp as the huge beast came bounding up to him. But instead of rushing fiercely at him, and bearing him down, it wagged its tail and began to lick his hands. Then Androcles saw that it was his own lion with whom he had lived in the cave, and he patted it and leaned on its head and cried.

All the spectators marveled at the strange scene, and the emperor sent for Androcles and asked him for an explanation of it. And he was so delighted with the wonderful story that he made Androcles a free man, and gave him a large sum of money. Thereafter, Androcles used to walk about the streets of Rome, and the faithful lion followed him like a dog wherever he went.

COMMENT GOTHAM ACQUIT UNE MAUVAISE RÉPUTATION

THE ENGLISH VERSION OF THIS STORY IS GIVEN ON PAGE 4126.

TOUT le monde a entendu parler des sages Fous de Gotham. Mais peut-être ne savons-nous pas qui ils étaient, ni où Gotham se trouve, ni ce que signifie exactement " Les sages Fous."

Voici l'histoire : Gotham est un village du Comté de Nottingham, et, un jour, Sa Majesté le Roi Jean d'Angleterre, allant vers la ville de Nottingham, ordonna que sa suite passât à travers la prairie de Gotham. Or on croyait alors que tout terrain par où passait le Roi devenait désormais route publique. Les gens de Gotham, qui tenaient à leur prairie, s'arrangèrent pour empêcher le Roi Jean d'y passer. Le Roi, rendu furieux par leurs façons, envoya ses officiers pour faire une enquête dans le village.

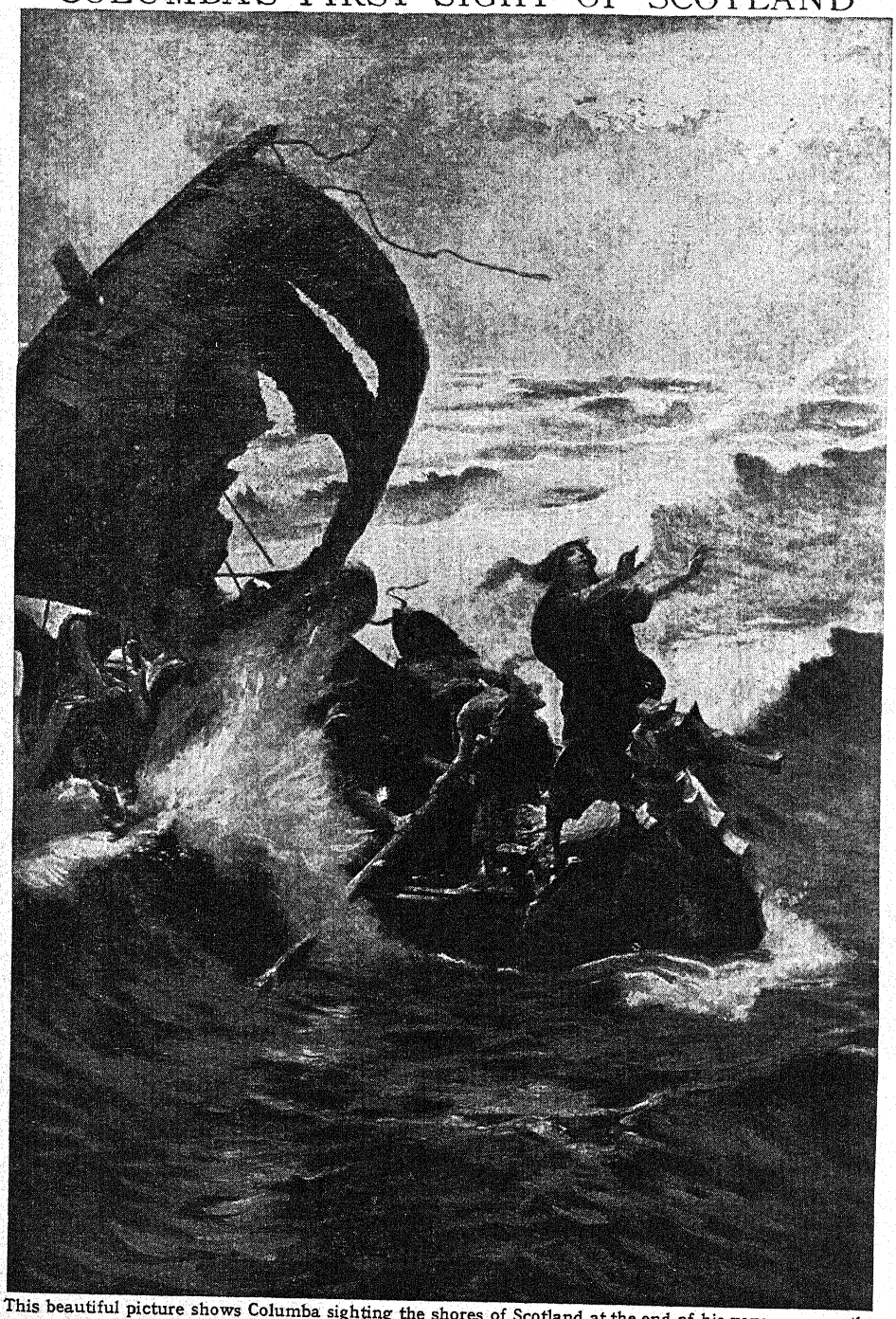
Quand les officiers arrivèrent, ils trouvèrent quelques-uns des habitants qui criaient et faisaient du bruit au bord d'un étang. Ils tenaient une anguille au bout d'une ficelle et essayaient, disaient-ils, *de la noyer dans l'étang!* Ils en virent d'autres qui faisaient rouler des fromages le long au bas de la route —leur donnant de l'élan et les laissant ensuite voyager tout seuls. Ils disaient qu'ils envoyaient leurs fromages au marché de Nottingham. D'autres hissaient en toute hâte, sur une colline, des camions et des charettes. Ils allaient, disaient-ils, mettre un bois à l'ombre des rayons brûlants du soleil. D'autres enfin construisaient une carrière autour d'un buisson où s'était installé un coucou, afin de l'empêcher de s'envoler.

Les officiers partirent à moitié amusés et à moitié dégoûtés, et annoncèrent que Gotham était un village de fous qui ne méritait pas l'attention du Roi.

Mais d'autres personnes, qui en savaient plus long sur cette histoire, dirent qu'il y avait des fous très sages à Gotham, et ainsi, la phrase en vint à signifier de la folie simulée dans un but raisonnable. En fait, c'était un compliment et non une critique à l'égard de Gotham. Un vieil auteur anglais, Thomas Fuller, dit : " Gotham a des gens aussi *sages* que ceux qui se rient, sans cause, de leur simplicité."

THE NEXT STORIES ARE ON PAGE 4859.

COLUMBA'S FIRST SIGHT OF SCOTLAND



This beautiful picture shows Columba sighting the shores of Scotland at the end of his voyage across the stormy seas which rage to the north of Ireland, where Columba lived. He went over to Great Britain with the Gospel more than thirty years before St. Augustine landed in Kent. This time Christianity, which had almost died out after being introduced by the Romans, came to stay and to revolutionize the lives of both the people and their rulers. Columba founded a monastery on the island of Iona, and from that place he sent out his followers to preach the Gospel to the dwellers in the northern half of Great Britain. We can still see the ruins of his monastery, where he lies buried. This picture was painted by Georges Girardot.



The newly-crowned king, Edgar the Peaceable, bids his eight vassal kings cease rowing, that he may hear the chanting of the monks, across the still waters of the Dee, from the minster of St. John.

EARLY LEADERS OF THE CHURCH

CONTINUED FROM 4734



IN the early days of Christianity, the Christians were persecuted by the rulers of the great Roman Empire, who imagined that the new teaching would persuade people that they might destroy the laws. But after a time all that was changed; Christianity became the most favored religion in the empire.

That meant that the clergy, who were the people who gave themselves up to the service of the Church, to praying, and preaching, and teaching—people who were appointed to this particular kind of work, in the particular way ordered by the rules which the Christians had made for themselves in early times—soon came to have a great deal of influence. Pious people gave them money and lands, so that they might build noble churches and cathedrals, and might use their wealth both in helping the poor and oppressed and in spreading Christianity among the heathen.

The clergy were a separate folk from the rest, who were called the "laity," receiving honor and reverence because of their high calling.

Then came the long centuries when new barbarian peoples were moving over the face of Europe, conquering and being conquered, and learning to forsake their old gods and to believe in "the Faith of Christ." In those days war and bloodshed were very common. But although the clergy were not at all secure from violence, yet they were protected much more than other people, and were allowed to give protection to other people who took refuge under their care. Those who fled for refuge to a church or convent were said to have taken sanctuary.

Moreover, in those days all the people in the western half of Europe belonged just to one Church. All the clergy were ruled over by bishops, which means overseers of great districts, which we call *Sees*, except that those who lived together in monasteries were not always subject to the bishops; and the Pope, the Bishop of Rome, was acknowledged as the head of them all, and was called the "Vicar of Christ," meaning the Viceroy of the Kingdom of God on earth.

Now, some of the clergy became missionaries who traveled among the heathen nations and taught them to become Christians, though most of them prayed and preached and taught among their own people. And, seeing that the lay-folk or laity had to spend so much of their time in fighting, it was only the clergy who were left in peace to think about learning and writing books. And because they were the only people who had much of the knowledge that could be gathered from books, kings often chose from among the clergy the counsellors they most trusted to make laws and explain them.

HOW PREACHERS REBUKED KINGS AND BECAME RULERS OF NATIONS

Sometimes wise and brave men among them would boldly tell the kings and the nobles that they were playing the part of tyrants, and therein disobeying the laws of God, as the prophets of whom we read in the Old Testament used to reprove the kings of Israel and Judah. Some of them held that, although the Pope was not a king, he was greater than all kings, who were bound to obey him, and that the clergy should obey the Pope rather than the king in whose dominions they lived; so that many times there were quarrels between the kings on one side, and the Pope and the clergy on the other, which are often described as quarrels between the State and the Church. And thus it happened that some of them had to become statesmen—that is to say, they had to take part in the governing of nations, even though they would have very much preferred to have nothing to do with such troublesome matters.

We shall not talk now about the early Fathers of the Church, which is the name given to the men who built up the great Christian society in the first centuries, nor about the martyrs who died because they would not sacrifice to false gods. But we may begin our list with the man who spread the faith in the northern part of Great Britain before Augustine landed in Kent and began to convert the Saxons in the south.

HOW COLUMBA AND HIS FOLLOWERS BROUGHT CHRISTIANITY TO SCOTLAND

This was the missionary who is called St. Columba. He was born in Ireland in A.D. 521 and lived there for a long time, and founded several monasteries. For the Irish were Christians while the great majority of the people in England and Scotland were pagans, though it is true that many of the Britons had remained Christians after the Angles and Saxons conquered so much of the country.

One of the men who had carried Christianity to Ireland, nearly a hundred years before Columba was born, was the interesting figure known to us as St. Patrick. He was probably born in Scotland, of a noble family, in 396, and was captured and taken to Ireland as a slave in 411. Escaping, he became a priest, and returned to work in Ireland. He died about 469.

When Columba was forty years old he resolved that he would go to the people of Scotland, who were related to the Irish, and preach the Gospel among them. So he went with twelve of his followers, and built a monastery on the island of Iona, of which we can see remains to this day. From that little island, he and his followers went out and preached the Gospel among the rude heathen tribes, and converted many.

Next we come to Pope Gregory I., who is rightly called the Great. He was a Roman noble, and might easily have become one of the greatest officers of the Roman Empire; but he chose rather the life of prayer and of service to God, having no thought of his own honor; and yet out of his self-denial the highest honor came to him unsought.

THE POPE GREGORY WHO SENT AUGUSTINE TO ENGLAND

Gregory's wisdom and his goodness won him such love in Rome that, when the Pope Pelagius died, all men said that no other man should be pope but Gregory; and, though he strove hard to be excused, no other man would they have. But, being made pope, he wrought nobly for the Church, and won barbarous peoples over to the true faith.

Moreover, it was this Gregory who sent Augustine to England on a mission to convert the Saxons, as we may read in Church Annals. He was fain to undertake this mission himself before ever he became pope, but even then the rulers of the Church could not suffer him to depart into a far country, having need of him at Rome. And besides all that he did to spread the faith of Christ, he did much to maintain discipline and agreement among the clergy. And men say he gave the Church those chants which are called Gregorian after him.

Now we come to the first Englishman on our list, the Northumbrian Baeda, who is commonly called the Venerable Bede. All England had already become Christian some years before he was born. In his time the kingdom of Northumbria was the most peaceful part of the land, and its kings cared much both for religion and for learning. Bede is famous not as a missionary, or as a statesman, but because, living quietly all his life in the monastery of Jarrow, he was known as a very learned man of his time, so that there was hardly anything which he he could not teach better than any other man living in England. But of the books which he wrote, two are most famous. One is his history of England, which tells us nearly all that we know of the early Saxon times, and the other is his translation, in the year A.D. 735, of St. John's Gospel into the Anglo-Saxon tongue, which is famous because of the story which is told on page 4452.

DUNSTAN, THE BISHOP WHO RULED ENGLAND AND PROTECTED THE SLAVES

A very different man comes next—Dunstan, another Englishman, who was born in 925. He was a very clever man, learned and skilled in all manner of arts and sciences, so that at one time men declared he must be a sorcerer. But what was more important was that he was a great statesman who was the real ruler of England for a great many years; and in those years, being Archbishop of Canterbury, he also made many changes in the government of the Church, and made the power of the clergy greater than before.

It was through the wisdom and the counsel of Dunstan that England prospered so greatly in the time of King Edgar, of whom it was said that eight vassal kings were the oarsmen who rowed his barge on the River Dee. For Dunstan said that the people who lived in that part of the land which was called the Danelaw, being for the most part not Saxons, but Danes, should be suffered to keep their own customs. His counsel was followed and they ceased striving to set at defiance the overlordship of the Saxon kings of the house of Alfred. Also he set himself to keep the clergy a folk apart from the laity by making them keep stricter rules, and forbidding them to marry.

One very good thing he did was to give protection to slaves and to teach their owners that it was a good thing to set them free. For in those days there were many slaves in England, and the law suffered their masters to kill them, and laid but light penalties on anyone who slew a slave. But Dunstan taught men that slaves are quite as good as other men in God's sight, and that the priests should not pronounce the words of pardon for wrong done to a slave unless the wrong-doer repented of his sin and did penance for it as much as if he had wronged a free man.

HOW THE CONQUEROR SET LANFRANC OVER THE CHURCH IN ENGLAND

When William the Conqueror made himself King of England, nearly a hundred years later, he was ill-pleased with the state of the Church in England, where the clergy had gone back from the strict ruling of Dunstan, and he brought over, to be Archbishop of Canterbury, an Italian whose name was Lanfranc, who had been the head of the Abbey of Bec, in Normandy. For William wished to have the help of the Church in keeping the Norman barons from becoming too powerful and troublesome, and he knew that Lanfranc would aid him therein.

To this end Lanfranc persuaded William to increase the power and wealth of the church, and also to separate the clergy from the laity even more than Dunstan had tried to do. Therefore, in the bishoprics and at the head of the great monasteries, called abbeys or priories, he set, whenever it was possible, not Englishmen, but foreigners, who lived by the stricter rule. He put an end altogether to the practice of the clergy marrying, and he arranged with the king that from this time the clergy should not be subject to the ordinary laws of the land in their private doings, but only to the law of the Church, and should be judged only by courts made up of clergy; and that, moreover, if there were disputes between clergy and laity, these Church courts should judge.

HOW THE RED KING'S WICKEDNESS WAS STAYED BY THE SCHOLAR ANSELM

Now, after William the Conqueror died, William Rufus, the Red King, came to the throne, and soon after that Lanfranc died also. The Red King would not appoint a new archbishop, but seized for himself the money which the archbishop should have had for

AUGUSTINE PREACHING TO THE EARLY ENGLISH: HIS APPEAL TO KING ETHELBERT & HIS QUEEN



4792

Gregory the Great sent Augustine to preach Christianity to the Saxons, who had ruled in England for a hundred years. He set foot in England at the very spot in Kent where Hengist and Horsa, the pagan Saxons, had landed, and founded a monastery at Canterbury, where he became the first bishop. King Ethelbert was persuaded by his wife, who was a Christian, to permit Augustine and his monks to preach the Gospel, and before long he was able to write to Gregory that over 10,000 people had been converted.

the use of the Church. Yet, when William fell very sick and thought he was about to die, he feared for his soul because he had robbed the Church, and so he appointed a new archbishop. Yet he fancied he could save his soul if he died, and continue in his evil courses if he lived, if he chose for archbishop someone whom he could frighten into working his own will; and so he appointed a certain very gentle and pious scholar named Anselm, another Italian, who was now Abbot of Bec as Lanfranc had been. Anselm was fain to refuse, but, as he might not, he very soon showed William how ill he had judged him by reason of his gentleness. The gentle Anselm was a very lion for boldness in the cause of justice and righteousness, and would in no wise obey the king's behests when they were evil, as they commonly were; nor would he suffer William to rob the Church or to set up bishops and abbots at his own will who would do his bidding and pay him great sums of money.



The sea-rovers often raided the English coasts and carried off men, women, and children to sell in other lands. Pope Gregory once saw some fair-haired slaves in the market at Rome. "Who are they?" he asked. "Angles," was the reply. "Not Angles, but angels," said Gregory; and it is said to have been then that Gregory resolved that the Gospel should be sent to the far-off home of those fair-haired strangers.



Three hundred years have passed away, and we now witness in this picture a very different scene. Christianity has been working its wonderful way through the length and breadth of the island, and here we see an English bishop setting free the slaves of a master who has become a Christian, and consequently felt it wrong that he should have the power of life and death over a servant.

The strife between them waxed so hot that Anselm had to leave England. When the Red King was dead, and the wise King Henry I. reigned in his stead, Anselm came back to England, and readily made agreement with the king that the bishops and abbots should do the king homage for their lands as the barons did, but should be appointed according to the rules of the Church, and not according

to the will and pleasure of a king whose intent might be evil.

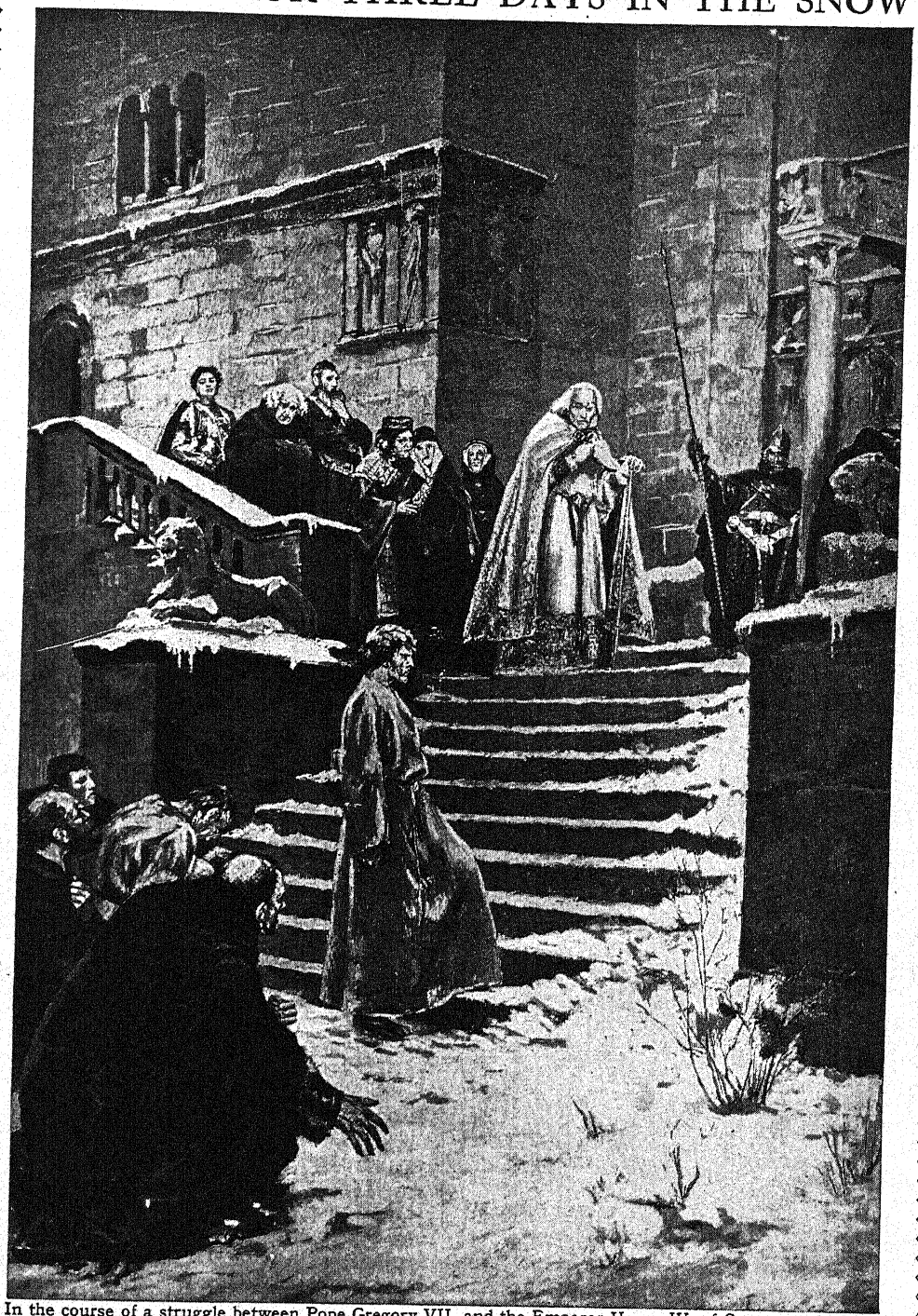
This quarrel between the kings and the archbishop was a part of a great quarrel between Church and State, which had been going on for many years past. For there had been at Rome a certain monk named Hildebrand, who had been the chief advizer of more than one of the popes, and then himself became Pope Gregory VII. Now, Gregory held that it was the will of God to rule the world through two powers—the temporal power, which means the emperors and kings of the different countries, and the spiritual power, which means the Church which was one in all lands, ruled over by the Pope. And of these two powers he accounted the spiritual power the greater; very much as Samuel and Elijah spoke the Word of the Lord to Saul and Ahab. And so it seemed to him that the reign of God upon earth would be made manifest only when emperors and kings humbled themselves before the Pope. And this he believed all the more because he knew that he himself loved righteousness and hated iniquity, whereas the emperors and kings sought their own advantage more than the glory of God. Therefore, Gregory would have the Church set wholly free from the rule of emperors and kings. But these latter were in no wise ready to believe that the bidding of popes and bishops

KING EGFRID OFFERING A BISHOPRIC TO THE MONK WHO HAD BEEN A SHEPHERD BOY



Here we see Egfrid, King of Northumberland, offering the bishopric of Hexham to Cuthbert, who began life as a shepherd, but became a monk at Melrose, and subsequently led the life of a hermit on an islet off Northumberland. It is not known whether he accepted the king's offer. In 685 he became Bishop of Lindisfarne, but resigned soon afterwards to return to his hermitage. He died in 687, and was buried at Lindisfarne, but his body was afterwards removed to Durham Cathedral. This picture was painted by W. Bell Scott.

AN EMPEROR THREE DAYS IN THE SNOW

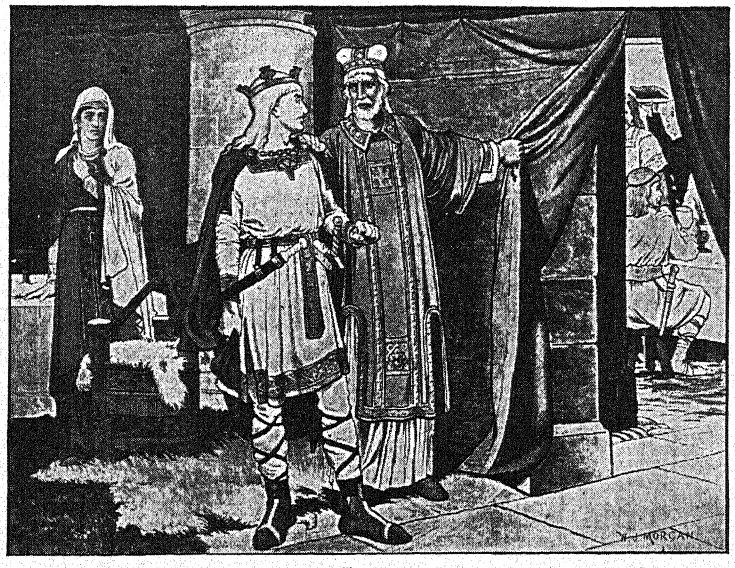


In the course of a struggle between Pope Gregory VII. and the Emperor Henry IV. of Germany, the Pope declared that the emperor could no longer be a member of the Church, and deposed him from his throne. Henry, unable to bear the results of this disgrace, journeyed over the slippery slopes of Mont Cenis, in the depth of a severe winter, that he might make his peace with the angry Pope. Gregory retired to the castle of Canossa, high up in the Apennines, where he was followed by the emperor. For three days Henry, clad in the thin white robe of a penitent, shivered in the courtyard of Canossa, and the Pope at length forgave him.

was in very truth the sound of the voice of God, and the kings would have all men in their realms obey them, priests as well as laymen. So there was strife between Pope Gregory and the Emperor Henry IV. of Germany.

HOW POPE GREGORY KEPT AN EMPEROR STANDING THREE DAYS IN THE SNOW

Seeing that those who wished ill to the emperor were ready enough to aid Gregory against him, the emperor was forced to humble himself for a time, and to stand in the snow in the garb of a penitent for three days, praying for the Pope's pardon at a place called Canossa, though in after time he defied Gregory again and got the better of him. Yet Gregory had taught so many men to believe that in this quarrel the cause of the Church was the cause of God, that for nearly two hundred years to come it often seemed that the Pope was mightier than emperor or king.



Dunstan was a very clever and pious Englishman. As Archbishop of Canterbury his influence over the kings was so great that he was himself the real ruler of England. He gave protection to the many slaves who were at that time in England, and encouraged their owners to give them their freedom. In this picture we see him reproving King Edwy because he had broken one of the laws of the Church.

So it befell that there was another pope to whom one of the greatest of the German emperors, Frederic Barbarossa, was forced to submit himself for a time; and this was the only Englishman who has ever been pope. His name was Nicholas Breakspear, but when he became pope he was called Adrian IV., just as Hildebrand has been called Gregory VII. But Adrian was not a great enough man to have been mentioned here, except for his having been the only Englishman that ever was pope. He died in the year 1159.

But in Adrian's days there was a famous archbishop who stood up against the King of England, Henry II. For the king saw that much evil came of the rules that had been useful when they were first made by Lanfranc and William, because the Church courts were now used to protect the clergy from being properly punished when they broke the ordinary laws of the kingdom. And he thought that if his friend, Thomas à Becket, were made archbishop, he would help him to make the clergy submit to the law. But when Becket became archbishop, he became the champion of the Church against the king, and would not submit to have any change made, declaring that the clergy must be punished only by the power of the Church and not by the power of the king. The brave Becket was slain in the cathedral at Canterbury, and how the king did penance for that murder, and did not dare any longer to strive against the power of the Church, we read in Church history; also how Adrian IV. bestowed Ireland upon the King of England.

POPE INNOCENT, WHO MADE STEPHEN LANGTON ARCHBISHOP OF CANTERBURY

And now we come to the pope whom some people reckon the greatest of all, for he was not only the most powerful, but also, like Gregory VII., he was one who loved righteousness and hated iniquity. Nevertheless, in after times men have not all agreed that he was right in some of the things which he counted for righteousness or for

iniquity. This was Innocent III., who was the youngest man who was ever made pope. Like Gregory, he believed that the Pope was set over the Church and over all men as a ruler, having all sceptres and thrones subject to him.

So great was Innocent's power that he was able to decide which of two princes who claimed to be emperor should be acknowledged. When the great King of France, Philip Augustus, committed sin, he made him cease from his wrong-doing, and the King of Leon, in Spain, in like manner; and we read in the history of England how he placed that land under an interdict, and would have taken away King John's crown and given it to the King of France, if John had not made submission. Therein Innocent thought he was doing rightly, though in England there were few who were ready to admit that any foreign priest, were he the Pope himself, had power and authority to choose a king for England. Yet the Pope did these things out of the desire that men should live righteously.

Now, there was one thing he did for which British and Americans alike should respect his memory, for the archbishop whom he chose for Canterbury was Stephen Langton; and Archbishop Stephen feared neither Pope Innocent nor King John, but stood up manfully for justice and right, claiming from the king for the Church no more than the Church's due, and yielding to the Pope's bidding no more than was his due. For what he had at heart was the good of the whole people of England. And when Innocent was reconciled to John by the king's submission, Langton was none the readier to suffer John to play the tyrant, but himself played a large part in uniting the barons to demand from the king the great Charter. This he did, though Innocent himself bade him desist. And thereafter, when John was dead, and there were some of the barons who disliked the Charter because it hindered them also from playing the tyrant over their vassals, it was by Langton's influence that the Charter was again confirmed in spite of them. This Charter is the foundation on which our liberty has been built. When Langton himself was dead, there were other bishops ready to follow the great example he had set, yielding to the dictation neither of Pope nor king nor barons, but standing up stoutly against tyranny and oppression. But of these there are two whose names should be remembered — Archbishop Edmund Rich of Canterbury, and Grosseteste, Bishop of Lincoln who was the friend of the great Earl Simon de Montfort.

Other bishops and popes there were in later days who strove hard in order to make the power of the Church greater than the power of the rulers, before the Reformation came; after which event the rulers were never again forced to bow to the will of the Pope, and the heads of the Church were never again the great power in the land that they had been.



Stephen Langton was one of the greatest churchmen who ever had power in England. He feared neither the Pope nor King John. In this picture he is persuading the barons to help him to obtain Magna Carta from King John. This picture and those on pages 4793 and 4796 are published by permission of the Society for Promoting Christian Knowledge.

THE NEXT STORIES OF MEN AND WOMEN BEGIN ON PAGE 4941.

ÆSOP'S FABLES TOLD IN FRENCH

The following stories, told in French, are from the fables of Æsop the Slave, of which a large number appear in other parts of this book. The stories appear in English in that part of our book beginning on page 2887, so that boys and girls learning French can translate them and compare the translation with the English copy.

LE CHIEN ET L'ÂNE

UN grand chien et un âne chargé de pain faisaient un long voyage ensemble. Tous deux, bientôt, eurent



très faim et l'âne s'arrêta pour manger des chardons au bord du chemin. Ceci augmenta la faim du chien et il demanda un morceau de pain de la charge de l'âne.

Mais l'âne répondit que s'il avait faim, il devait trouver sa nourriture le long du chemin, comme lui-même, car il n'avait pas de pain à donner.

A ce moment, ils virent au loin un loup venir vers eux. L'âne aussitôt se mit à trembler et dit au chien qu'il espérait qu'il l'aiderait et le protègerait si le loup l'attaquait.

"Non," dit le chien. "Ceux qui mangent seuls, doivent lutter seuls."

Et il abandonna son compagnon à la merci du loup.

Si vous voulez des amis, soyez amical.

L'AVOCAT ET LES POIRES

UN avocat fut invité un jour à un banquet de mariage dans une maison assez éloignée de la sienne.

Sur son chemin, il trouva un petit



panier de poires mûres au bord du sentier. Il avait assez faim pour les manger pour son déjeûner, mais il songeait au festin et ne voulût pas gâter son appétit; il donna donc un coup de pied aux poires et les envoya dans le fossé boueux.

Un peu plus loin, il dût traverser une petite rivière; mais elle était tellement grossie par les pluies récentes que la passerelle avait été emportée, et il n'y avait aucun bateau en vue.

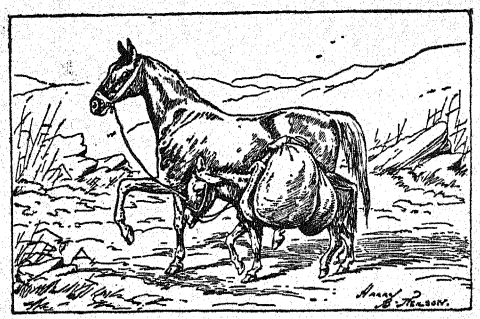
Finalement, l'avocat fut obligé de renoncer à l'espoir de traverser la rivière et il reprit le chemin de sa maison. Il avait si faim maintenant que lorsqu'il arriva près des poires sales qui étaient au fond du fossé, il fut heureux de les retirer, de les essuyer aussi bien que possible, et d'apaiser sa faim en les mangeant.

Qui ne gaspille pas n'a pas de besoins.

LE CHEVAL ET L'ÂNE

UN cheval et un âne voyageaient ensemble sur une route, et l'homme qui les possédait les suivait.

Le cheval n'avait rien sur son dos; mais l'âne était chargé si lourdement



qu'il pouvait à peine avancer. Il pria donc le cheval de l'aider en portant une partie de sa charge.

Le cheval était méchant et égoïste, et refusa son aide si bien que bientôt le pauvre âne tomba épuisé sur la route et mourut. Le propriétaire des deux animaux essaya d'alléger la charge de l'âne, mais il était trop tard. Il prit donc toute la charge et la mit sur le dos du cheval, avec la peau de l'âne mort, ainsi, l'égoïsme du cheval, en refusant de rendre un petit service, ne lui rapporta qu'un surcroît de travail et de peine.

Nous ne gagnons jamais rien à être égoïstes et malveillants.



TALES OF THE INDIAN MUTINY

CONTINUED FROM 4746

IN the great Indian Mutiny, which took place in the last century, many heroes performed brave deeds. Here are two splendid acts of deliberate self-sacrifice, both of them done at the beginning of the outbreak.

The mutiny began at Meerut on May 10, 1857, when, after murdering their British officers, a number of sepoy regiments marched to the great city of Delhi, the old capital of the Mogul Empire.

In the morning the mounted troops were seen approaching Delhi. The rumor was quickly flying from mouth to mouth that the army had risen against the British, and that the white man's rule in India was at an end. The troops poured in; the mob was soon raging through the streets seeking for Englishmen to kill.

In the telegraph-office was a young clerk. He made no attempt to escape, but stood coolly by his instrument, flashing his warning along the wires to other parts of the Punjab. The words of his message show his coolness: "The sepoys have come in from Meerut, and are burning everything. Mr. Todd is dead, and, we hear, several Europeans. We must shut up." The wires had hardly carried their message when the mutineers broke in and cut him down.

Another deed worthy to be remembered here is that of Lieutenant Willoughby and his eight gallant comrades, who were in charge of the great powder magazine, where there was a huge store of gunpowder and ammunition. The mutineers were certain to seize this at the first chance, and to make deadly use of the powder. The place was very strong. Even nine men—there were no more—might hold it for some hours; help *might* come. But if not—well, it was better that the magazine should be blown up and its defenders perish than that it should fall into the hands of the mutineers.

So those gallant men placed the guns they had where they could be used with best effect, and laid a train of powder from the magazine itself to the courtyard where they must fight. One, named Scully, was in charge, with orders to fire the train if he received the signal. Soon the mutineers were swarming round; but the defenders paid no heed to a demand for surrender. Ladders were planted against the walls, yet the little band within poured so hot a fire on the assailants that they were beaten off again and again.

But the ranks of the enemy grew thicker and thicker. No help came. And now the enemy were crowding up the ladders; in a few moments they must force their way in. Then suddenly there was a terrific roar, and a huge column of smoke spouted up to the sky. The signal had been given; Scully had fired the train. The magazine and its assailants had been

blown to fragments. Scully died where he fell. The only wonder is that the rest of the defenders survived, and five of them received the Victoria Cross; Willoughby, their gallant leader, was wounded, and died soon afterwards in Meerut.

Another brave man was Golab Khan, a servant of Mr. Greathed, the Commissioner at Meerut. When the mutineers attacked Mr. Greathed's house, the family were in great danger. Then, to save them, Golab Khan risked his own life, for he went out to the mutineers and said that if they would come with him he could show them where the sahibs, as the natives call the white people, had hidden themselves. And by thus tricking the mob, and leading them from the house, he made it possible for the British Commissioner and his family to escape, though he himself would certainly have been murdered if the mutineers had found out that he was leading them astray.

THE SLAVE WHO SAVED HIS MASTER

ABOUT the time of the French Revolution there were uprisings of the people in other countries besides France, attempts to overthrow governments and to get equal rights for every man.

The spirit of revolution touched the beautiful island of St. Domingo, in the West Indies, where dwelt French creoles and their slaves who worked in the coffee, sugar, and other plantations on the island. A decree arrived from the National Convention in Paris that there should be equality of blacks and whites on the island. This the French creoles refused; but the slaves rose to claim their rights, and much bloodshed followed, until, in the end, the negroes got power over the island.

In the dreadful story of that struggle a name that is remembered with honor is that of Eustache, a negro on a sugar plantation. Though an ignorant, untaught man, he was by nature very intelligent, simple-minded, and good, with a high standard of duty.

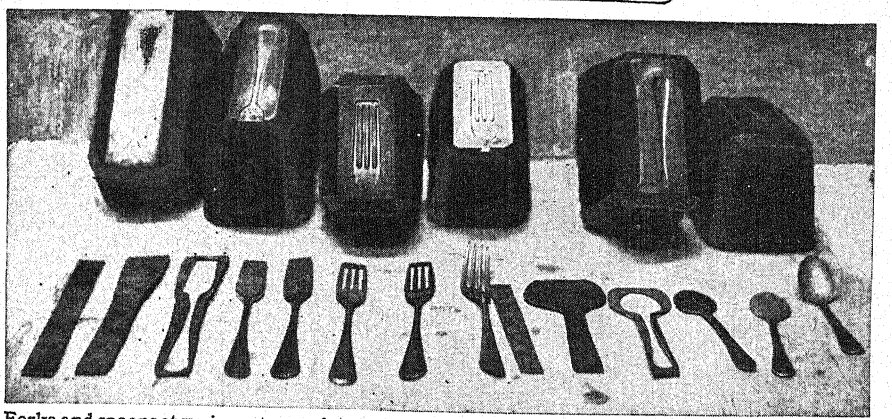
When the slaves rose against their masters, and massacred them, he saved the lives of fully four hundred white people, yet did not betray his fellow-negroes. He helped his own master, Monsieur Belin, on board a vessel sailing to the United States, so that he might escape from the island, and, regarding himself as still his slave, he also boarded the vessel. An English ship captured the boat, and though the sailors were a rough lot, they let the negro have his liberty. Eustache took advantage of this to amuse them and divert their attention while he freed and armed the prisoners, who then put their captors under hatches, and sailed for Baltimore. There Eustache got work, but gave what he earned to white refugees from his native island. Then, when his master, thinking all safe, ventured back to the island, Eustache went with him But the lives of the French were still in danger, and Monsieur Belin had to flee to the shore again. Eustache lost sight of him, but managed to hide some of his property; and when he did discover his master, he got both property and master safely on board a vessel which also happened to be sailing for Baltimore.

One of other numerous acts which show the negro's devotion to that same master is his learning to read. Was ever a more generous motive for it than this? Finding his master was troubled by weakening eyesight, Eustache got someone to give him lessons in reading, secretly, at four o'clock each morning, so that later he was able to interest and amuse his old master by reading to him.

It need hardly be said that Eustache's grateful master freed him, and left him money, which Eustache well knew how to use to help people in distress, though he himself, that he might have the more to give, lived on his earnings as a cook.

There were many people who found a real friend in the good-hearted negro. He would buy tools for poor workmen, apprentice penniless boys to trades, and find women to nurse and take care of little children. The fact that a man, woman, or child was in trouble was enough to rouse the beautiful spirit of benevolence and unselfishness in this man, a spirit that was inspired by the service of God; for when praised for his deeds, all that he could reply was that he was not doing them for man, but for the Master.

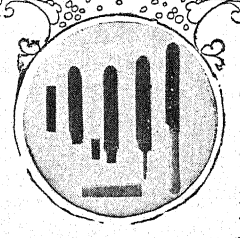
THE NEXT GOLDEN DEEDS ARE ON PAGE 4973.



Forks and spoons at various stages of their manufacture with the dies by which they are stamped out.

A TALE OF A KNIFE AND FORK

CONTINUED FROM 4703



FOR ages and ages men never dreamed of having knives and forks. The first sort of knife that they used was probably the sharp edge of a shell, gathered on the beach where they caught the shell-fish which formed their food. By and by they improved on this, and made knives and axes and spear-heads of hard flint stones.

The men of the Stone Age used their flint knives for cutting up the flesh of the animals, which they had caught, just as the Indians did when the white men came to America. They did not need forks. The fork, which grew out of the spear, came a long time afterwards. The first forks were used to spear fishes, and were made with three prongs, of which the two outer prongs were barbed. If we want to see what they were like, let us look at a pickle fork, and imagine it to be made, on a much larger scale, of flint or bone, or even of some hard wood.

Later on forks were used in cookery, and then centuries passed before any one thought of using them at the table. It is almost certain that Queen Elizabeth and the ladies of her court ate with their fingers; and it is more than likely that our Mayflower ancestors never saw a fork smaller than those they used in cooking and serving meat. It is said that the luxurious Venetians used table forks in the eleventh century, and Charles V of France had a few forks for his own use in the fourteenth century; but it is said that forks with which to eat food did not become known in Great Britain until the seventeenth century, when they were brought by a traveler from Italy. Until then, in the king's palace and in the noble's mansion, only the man who carved the joint would have a fork to help him. Even to-day the Persians and the Egyptians eat with their fingers and think that Americans and Europeans are very queer people to prefer using forks, and as we know most of the Chinese and Japanese still use chop-sticks.

In England, Sheffield is the great place for cutlery. London and Birmingham once had a big share of the trade, but during the last hundred years the Yorkshire city has so largely increased its manufacture of knives and forks, that it has left its rivals in this trade far behind.

CUTLERY MAKING IN AMERICA BEGAN IN NINETEENTH CENTURY

Germany has long been noted for its cutlery, which is chiefly made in

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Solingen, a town near Dusseldorf, which has been famous for centuries for its swords.

It is probable that some knives were made in America in the early days of its settlement, but if so their number was small. The making of cutlery in sufficient numbers to term it an industry, was not commenced until the nineteenth century. The first cutlery factory in the United States was opened in Worcester, Massachusetts, in 1829. Three years afterward the making of table cutlery was commenced in Maine, and ten years later than that the manufacture of pocket knives began in Connecticut.

There is not in the United States, as in England, France, and Germany, one great manufacturing centre for cutlery. A good deal is made in the states of Massachusetts, New Jersey and New York, and there are also factories in New Hampshire, Connecticut, Ohio and other states.

MANY KINDS OF CUTLERY MADE IN THE UNITED STATES

The ordinary silver plated knives and forks, which we use so generally, are made in the United States. So are very large numbers of pocket knives, a large proportion of the scissors that we use, and a great many other things that come under the general name of cutlery. Some of our fine scissors and a great many surgical instruments come from abroad, and immense quantities of very cheap knives and scissors have until recently been sent to us from Germany, where they are made at a very low cost.

Until recently cutlery making in Europe has been almost entirely what is known as a cottage industry, and although there are now some large factories in Solingen, a large proportion of the cutlery produced there is still made in the homes of the men. A different system is followed in Sheffield. Here, too, there are some large factories, but in much the larger number of cases, knives or scissors or surgical instruments are made in small establishments where only a few men are employed. Except in the large factories, little expensive machinery is used, but the small manufacturers, or "small masters," as they are called, generally make their knives from steel blanks which have been forged out in large establishments. The use of these blanks saves much time in manufacture.

THE MEANING OF THE TERM "COTTAGE INDUSTRIES"

"Cottage industries," of which we have spoken, is a term given to trades which are followed by men and women in a room in their own homes, or in a small workshop built in a yard or garden. Sometimes these workers are able to sell their goods direct to merchants. As a rule, however, work is given out to them by large manufacturers, or dealers who find they can get it done more cheaply in this way than if they had to keep up a very large establishment of their own.

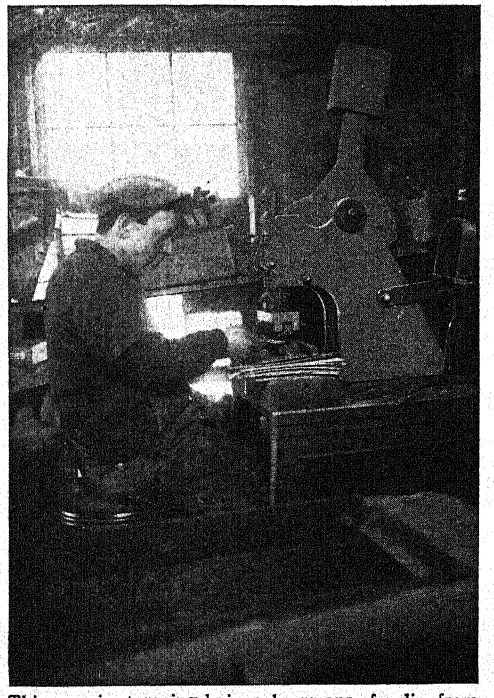
In the United States, where cottage industries never gained a strong footing, cutlery has from the first been made in factories, and more machinery, such as steam, or electrically driven forging hammers, dies and grinding wheels, is used. Still, a great deal of hand work is necessary to make really good cutlery, and even for the processes in which machines are used, skilful workmen are needed.

The blades for cheap knives and razors and scissors are stamped out by dies. For the better cutlery, however, the steel is cut into proper lengths, and then forged, or beaten out, by heavy machine-driven hammers until it has been made sufficiently thin. After that has been done they are hardened, tempered, ground, and fastened to their handles; they are polished until they shine like mirrors, nickel or silver plated, sharpened and finished. The cheaper silver plated knives, which are not very sharp, and are not very flexible, are cut to the length of the knife, and forged in one piece in which the handle is included.

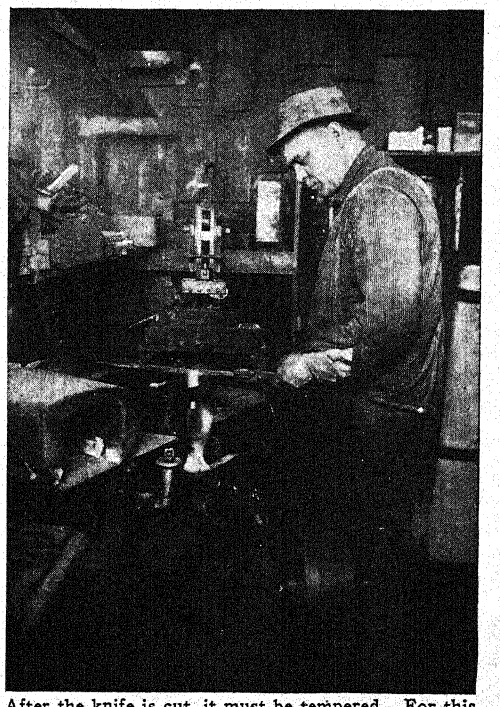
THE MAKING OF SHEARS AND SCISSORS

It may surprise you to learn that the blades of many of our shears and scissors are made in two pieces. Very fine scissor blades are made in one piece of fine steel and are often forged by hand. Only skilful workmen can make these scissors; the making of the "eyes" in the handles is especially difficult. Hand made scissors are naturally expensive, and a cheaper way of making the large scissors and shears used by tailors and other workmen, has been devised. The handles and backs of the blades of these implements are made of soft steel, which is brought to a white heat, and forged with heavy hammers. It is then cut with dies into the shape of handles and blades.

MAKING AND TEMPERING A KNIFE BLADE

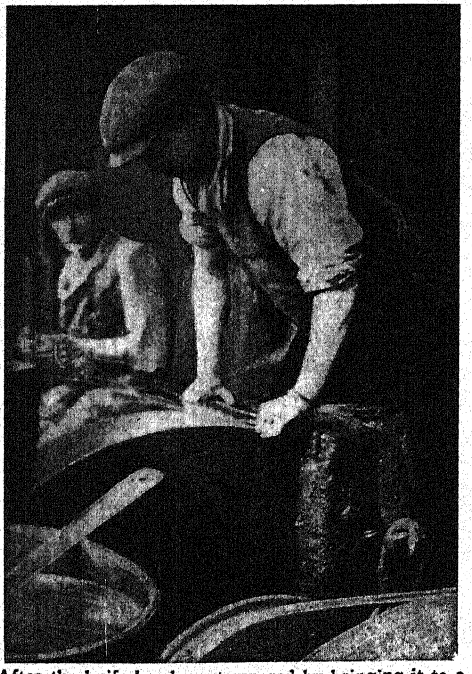


This man is stamping knives, by means of a die, from lengths of steel which has already been forged into the correct wedge shape needed for a knife, a little thicker at the back than in front.



After the knife is cut, it must be tempered. For this purpose, the steel is brought to a red heat, and then suddenly cooled. Here the blade is being heated.

Two pictures copyright, Press Ill. Service, Inc.



After the knife has been tempered by bringing it to a red heat and then plunging it into cold water or oil, it is placed upon a flat stick hollowed out for the bolster and ground as we see here.



Much care is taken in cutting up ivory tusks for handles, as ivory is very valuable, and the tusks in this picture are worth many dollars. This man is sawing tusks into proper lengths for knife handles.

When this is done, a thin plate of very fine steel is welded to the front to form a cutting edge. Afterward the blades are finished and fitted in pairs, polished, nickel plated and carefully fastened together, ready for use.

The making of knives and scissors, even when machinery is largely used, is very complicated and includes many processes. The steel, which must be very hard, must be carefully forged. It must be tempered to make it pliable, ground to make it sharp, and after it has been hammered, and beaten and ground it must be polished so that it will keep its brightness.

Knife handles are made of different substances. Horn, bone, ivory, tortoise-shell, celluloid, wood, silver and even gold are all used, and putting the knife into its handle, or hafting the blade, is a special trade. The best knife blades, like the best scissors, are hand-forged, or beaten out from a thin bar of steel of the thickness of the back of the blade. Scissors must be so carefully put together that the blades will meet and pass each other at exactly the right angle to enable them to shear through the substance that they are to cut. Sharpening is always done by hand, and to give the knife or scissors blade a proper edge, it must be held against the sharpening stone at a particular angle.

All this means a great deal of work, and you will not be surprised that the knife that you got on your birthday, or at Christmas, was put through at least a hundred different processes in the course of its manufacture.

HOW OUR SPOONS AND FORKS ARE MADE

Some spoons and forks are made of silver, some of the very cheap ones are made of brass, but the larger number are made of an alloy composed of certain proportions of tin, copper and zinc. Spoons and forks are all pressed into shape and cut with dies, and are then carefully polished and cleaned. After this has been done, those that are not made of silver are silver plated.

For the purpose of silver plating our forks and spoons, a bath is prepared in which silver is dissolved by the aid of chemicals. The forks or spoons are suspended in the bath by copper or silver wires. They are hung in such a way that they are covered by the solution, and can be moved about in it. Then electricity is turned on, and by its means the silver is made to leave the chemical solution and adhere to the metal of which the spoons or forks are made. An interesting thing is that the anode, or positive pole, through which the electric current is sent into the bath, is made of silver. The silver of the anode is gradually broken down, or dissolved, by the current and is added to the solution, so that although the silver is constantly leaving it to cling to the spoons or forks, the bath always holds about the same proportion of the precious metal. Unless the metal in the objects to be plated is exquisitely clean, the silver will not cling to them, and to make them ready for the coating, they are washed in chemicals before they are put into the bath.

After they have been taken out of the bath they are put through a number of processes, and when they are finished and packed in tissue paper, they look almost as if really made of silver.

Not very many years ago, all table forks were made of steel, and indeed, in some places steel forks are still used; forks for campers' use, for instance, are nearly always made of steel. Carving forks are made of very fine steel, and as much care must be taken in their manufacture as in the manufacture of knives.

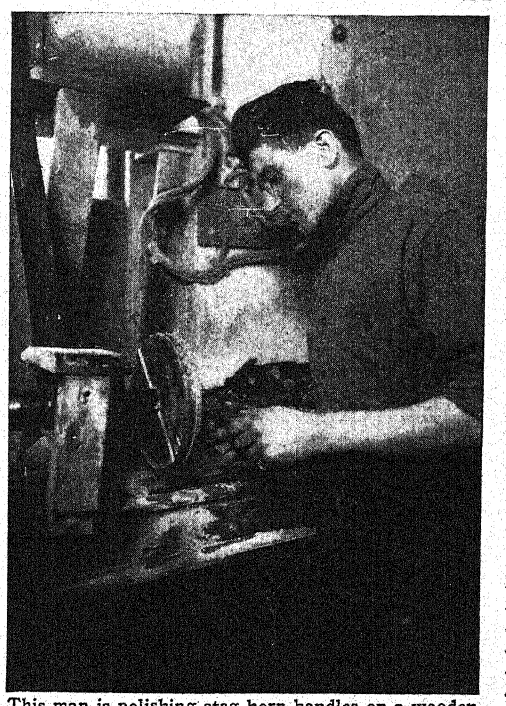
The first spoons were probably just shells picked up on the shore, and something very like the shape of shells has been kept in spoons ever since. In the tombs of the Egyptians, spoons of wood, stone and ivory have been found; probably the poorer people among the Greeks and Romans had to be content with wooden spoons, but people of wealth used bronze and silver. In the Middle Ages, spoons were made of wood, or bone, or tin, and, as you know, wooden spoons are still sometimes used in cookery. At the end of the Middle Ages, silver spoons were made for very great people, but it was not until silver became plentiful in the nineteenth century, that people of ordinary means could afford to use silver spoons on their tables. Large numbers of spoons are still made of tin, or of iron roughly coated with tin, but these spoons are stamped out with dies, and finished in the cheapest possible way. Some spoons are now made of aluminum.

THE NEXT STORY OF FAMILIAR THINGS IS ON PAGE 4885.

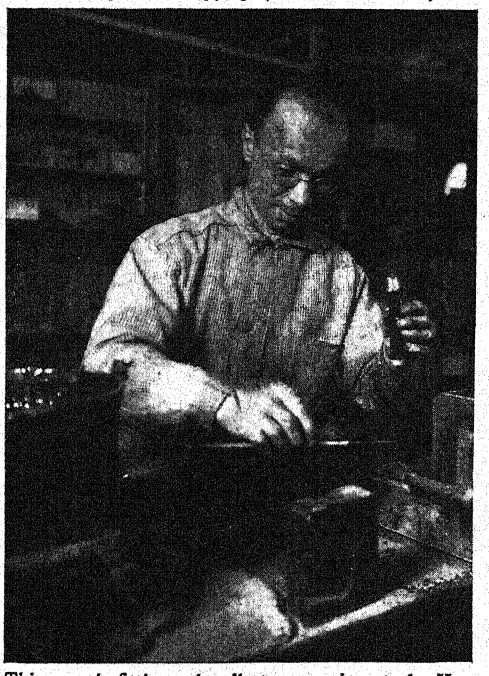
PUTTING BLADE AND HANDLE TOGETHER



This man is cutting stag's horns into handles for carving knives and forks. Stag horn is also used largely for boys' pocket knives and large clasp knives. First three pictures copyright, Press Ill. Service, Inc.



This man is polishing stag horn handles on a wooden wheel, which is covered first with leather and then with a mixture of emery and glue. After the polishing, each handle is fitted with a metal ferrule.

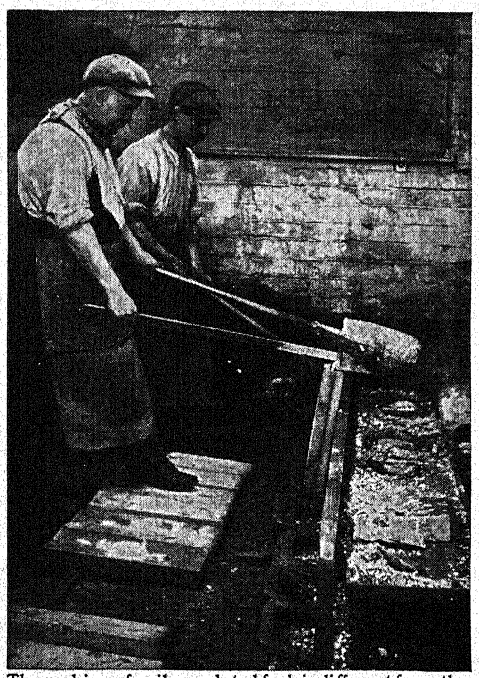


This man is fitting a handle to a carving steel. You can here see plainly the rough tang which runs into the handle, and the raised part or bolster, which fits tight against the ferrule.

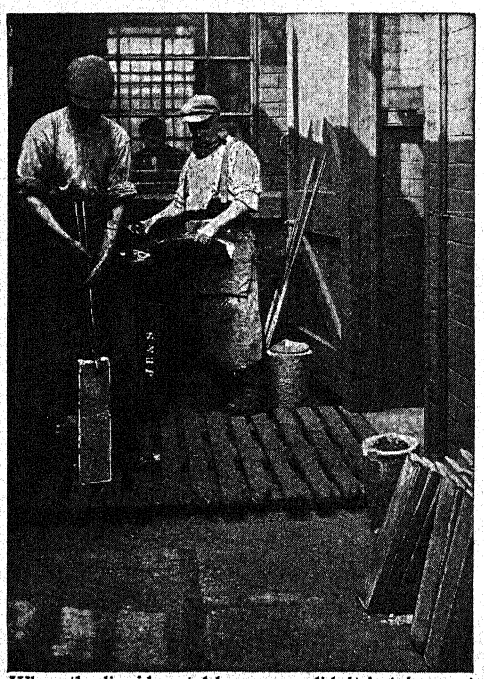


After the handle has been put on, the blade is whetted or sharpened, to a keen cutting edge, on a fine wheel. The blade is then burnished and polished or plated, and the knife wrapped in tissue paper.

STAMPING OUT THE METAL FORKS



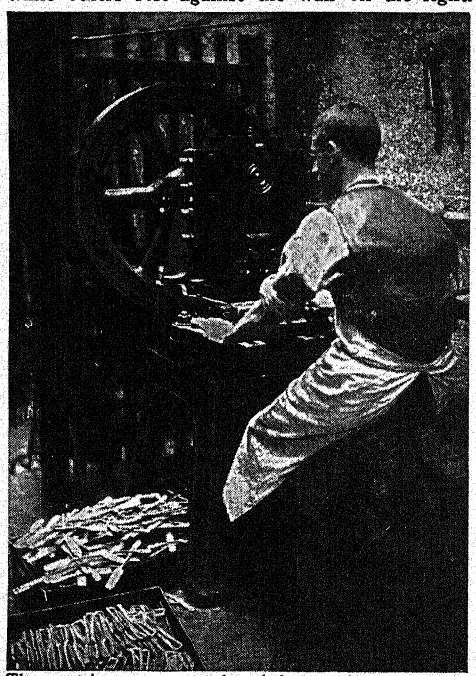
The making of a silver-plated fork is different from the process of making a knife. Here we see the melting-house, where the metal that will be turned into forks is melted and poured into molds as shown.



When the liquid metal becomes solid, it is taken out of the molds in the form of slabs, known as ingots. In this picture a workman is holding an ingot, while others rest against the wall on the right.

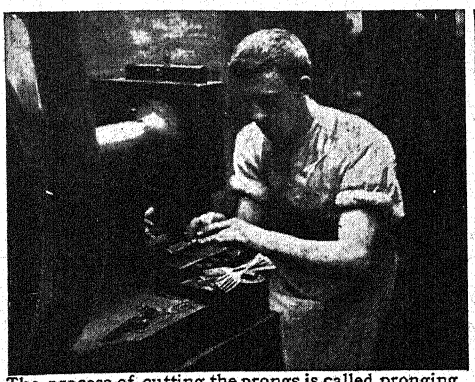


The metal is now rolled out, as though it were putty, by the machine shown here. Then it is cut into strips about the width of an ordinary fork and again rolled, one end being made thinner than the other.

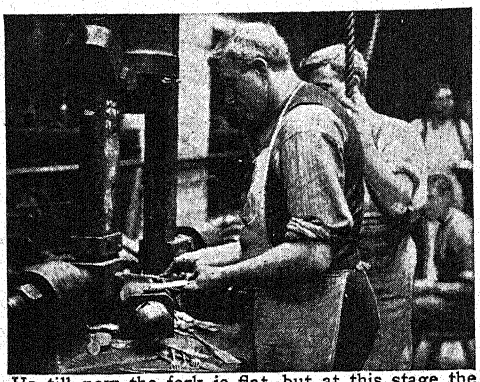


These strips are now placed in another machine, that stamps out the rough shape of the forks, with the prong end quite solid, as can be seen by the shapes lying in the box at the side of the machine.

SHAPING THE FORKS AND SPOONS



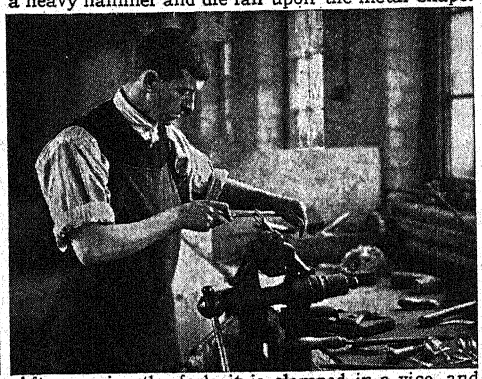
The process of cutting the prongs is called pronging. When these are roughly stamped out, as is being done in this picture, a strip of metal is left at the tips of the prongs in order to keep these together.



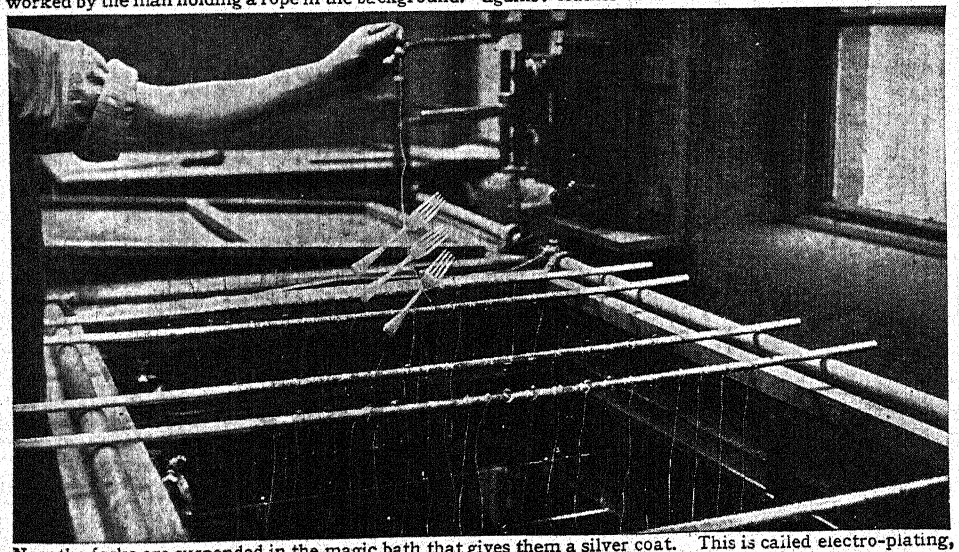
Up till now the fork is flat, but at this stage the handle and prongs are bent, or curved, into the shape of the forks we use. This is done by letting a heavy hammer and die fall upon the metal shape.



This picture shows us how the bowl of a spoon is shaped in a way similar to that in which the forks are curved. The heavy hammer that does the shaping is worked by the man holding a rope in the background.

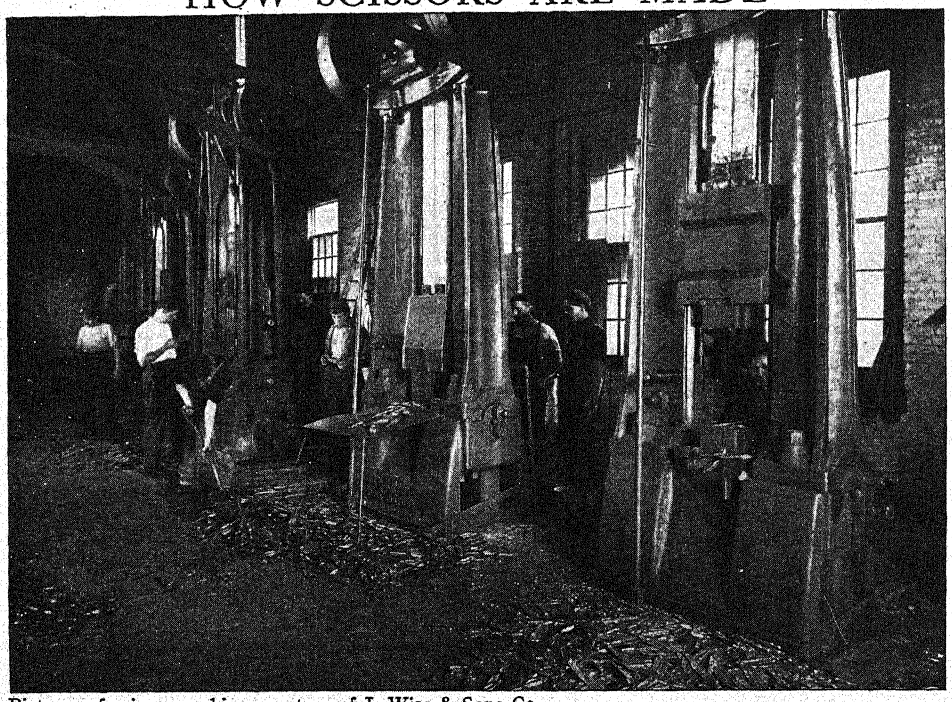


After curving the fork, it is clamped in a vice, and the metal strip that joins the prongs is filed away. Next it is buffed, or made smooth, by being pressed against leather wheels dressed with sand and oil.



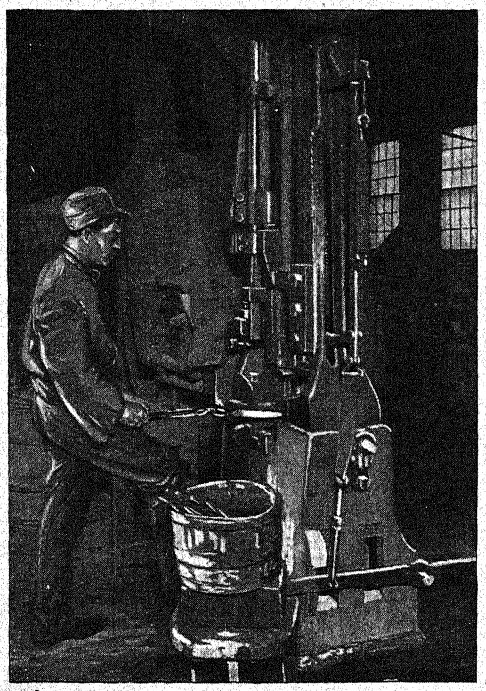
Now the forks are suspended in the magic bath that gives them a silver coat. This is called electro-plating, and the picture shows how the forks are suspended. They are left in the bath a certain time to receive their silver coat, and when taken out are a dull white colour. By burnishing and polishing they are soon made shiny and ready for the table. Although simple in theory, electro-plating needs great skill and experience.

HOW SCISSORS ARE MADE

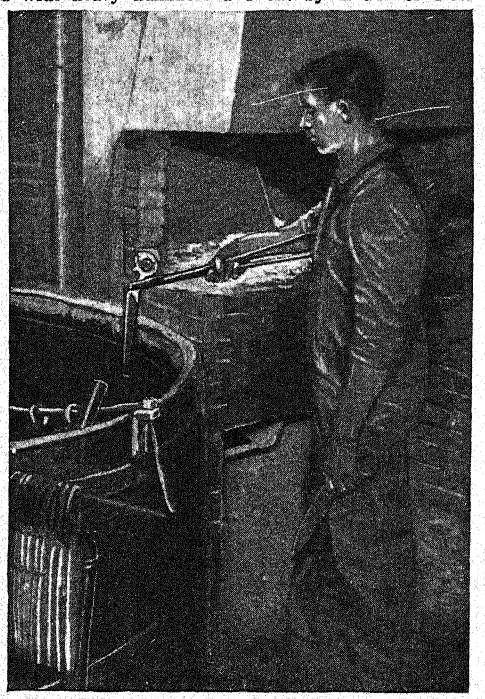


Pictures of scissors-making courtesy of J. Wiss & Sons Co.

The blades of very fine scissors and surgeons' scissors are made by hand from very hard steel, but the blades of the shears and scissors in ordinary use are made in two pieces. The handles and backs of these implements are made of soft steel, which is forged with heavy hammers and cut by means of dies.



Soft steel will not keep a sharp edge, and after the frame has been forged, a piece of very fine, hard steel is welded to the inside of the blade to form a cutting edge. This man is welding the pieces together.



When the welding has been done, the blade is trimmed and the screw hole carefully drilled. The blade is then hardened by heating it and chilling it. When this has been done, the steel is tempered.

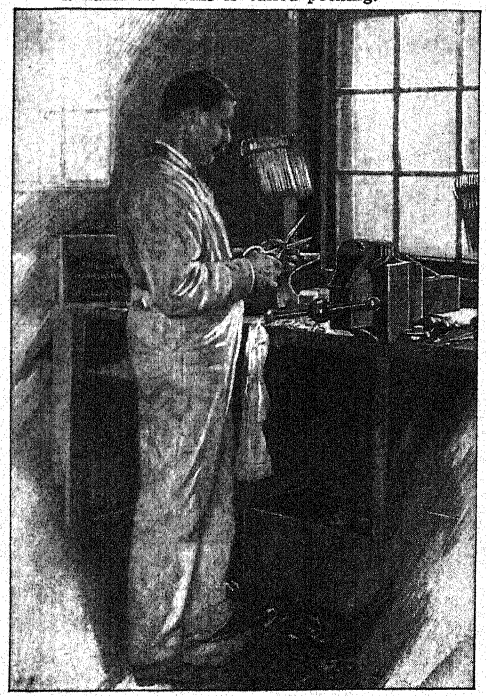
STRAIGHTENING AND FINISHING SCISSORS



After the welding is done, our shears go through the same processes as one-piece scissors. This man is straightening a tempered blade by tapping it lightly with a hammer. This is called peening.



The blades are still rough, and they are now carefully ground until they are quite smooth and sharp, and ready for the polisher. They are then paired, and screwed together into pairs of shears, or scissors.



These shears or scissors are now polished as carefully as a knife, and nickel-plated, and as a last step are inspected by men who adjust the blades so that our scissors will cut straight through cloth or paper.

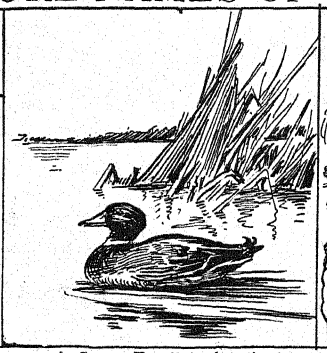


This interesting picture shows clearly the steps taken in the making of a pair of shears. High carbon crucible steel is a very fine, hard steel, which is used to make cutting tools, which need a sharp edge.

PUZZLE PICTURE-NAMES OF FAMOUS MEN



1. A King of Early Rome.



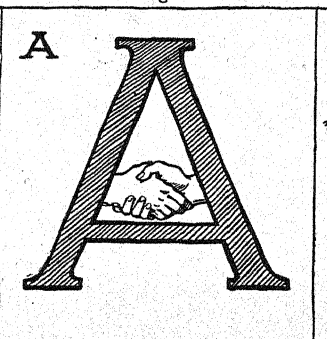
2. A Great English Admiral.



3. A Real Robinson Crusoe.



4. An African Explorer.



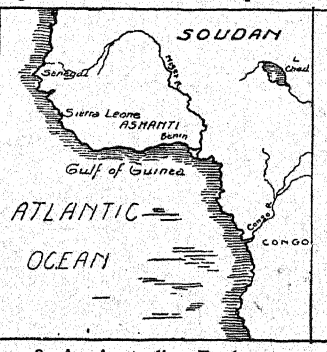
5. The Mother of an Emperor.



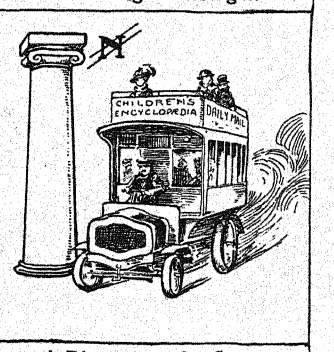
6. A King of Portugal.



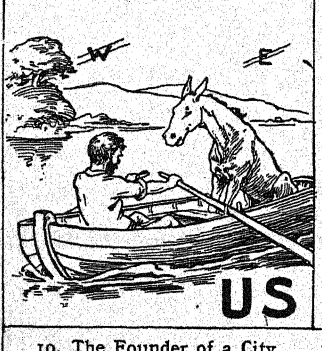
7. A Great Discoverer.



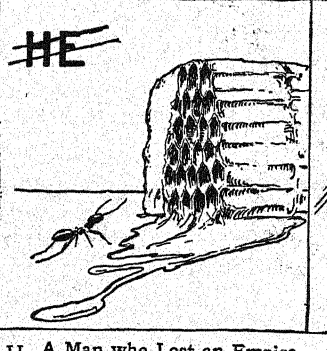
8. An Australian Explorer.



9. A Discoverer of a Country.



10. The Founder of a City.

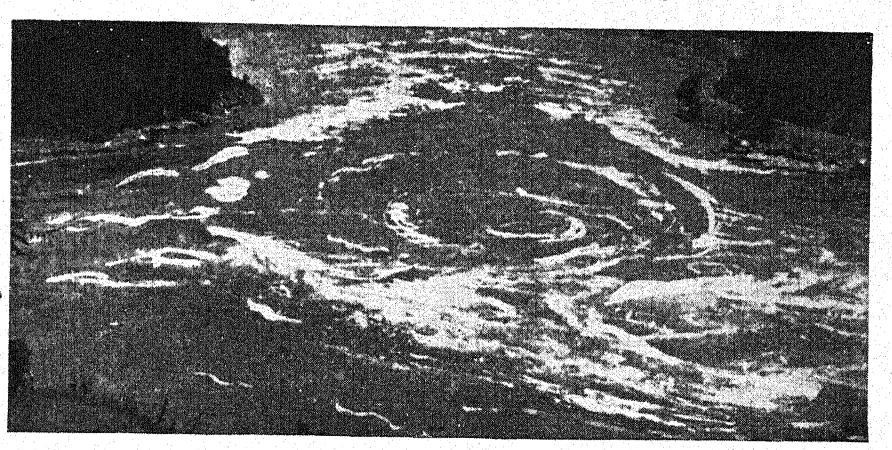


11. A Man who Lost an Empire.



12. An Immortal Poet.

The pictures on this page represent names of famous men whose stories are told in the Book of Knowledge. Their names appear in the "Book of Men and Women" and the answers are on page 4829.



WHAT MAKES A WHIRLPOOL?

CONTINUED FROM 4696



WE make a little whirlpool when we stir our tea, and a whirlwind moving above water will set it whirling for a time. But in many parts of the world there are great whirlpools which remain from day to day or from century to century. The cause of them is the meeting of two currents of water, especially rapid and strong currents. When we take a top or a ball and hold it between our hands and spin it by pushing one hand from us and pulling the other hand towards us, we really see exactly how two opposing currents may treat the water where they meet.

There is a great whirlpool below the falls of Niagara; another, about which wonderful stories have been told, is the famous Maelstrom off the coast of Norway; but the most famous of all is the whirlpool called Charybdis, in the Strait of Messina. We know that this whirlpool existed thousands of years ago, but the region is very liable to earthquakes, as everyone now knows, and it is said that the position of Charybdis has been altered in consequence.

Not far from where Charybdis used to be there was a great rock very dangerous to sailors; its name was Scylla. It was very difficult for small ships to pass between the whirlpool and the rock without being engulfed in the one or wrecked upon the other, and to this day, when a man has to steer his course of life carefully between two dangers, we say that he is between Scylla and Charybdis.

HAS A MICROBE SMALLER MICROBES ON IT?

The more we study the world, the more necessary and right does it appear to ask, and to try to answer, such questions as this. For our notions of great and small really depend just on what happens to be our own size; and that proves nothing.

The farther we go in the great world, the more we find, and the same is true the farther we go in the little world. The whole universe known to us may be only an atom in the eyes of God, and before we decide that there is a limit in the direction of smallness, we must try to prove it.

But we have good reasons for allowing ourselves to say "No" to this question. When we study the size of microbes, we study, also, so far as we can, the size of the molecules, or particles of the chemical substances that make up their bodies. And we may try to compare the two sizes. Now, when we do so, we find

that microbes are really so small that probably independent living things could not very well be much smaller than they are. But, so far, we can only be fairly certain about the answer to this question.

It is well to remember how very small microbes may be—for instance, less than one twenty-five thousandth part of an inch across. This is, of course, very much smaller than the smallest kind of animal or plant that we can see. So the answer to our question would be different if it were: Does a tiny insect have microbes on or in it?

It is found that all sorts of living creatures which, not long ago, were thought to be the smallest kinds of life may house countless microbes. Tiny insects, smaller than an ant, for instance, may have vast numbers of microbes living on or in them; and that sometimes is how we get serious illnesses. These insects bite us, and they leave a few of their tiny microbes behind.

WHEN WE RUN INTO A WALL, DOES THE WALL PUSH US BACK?

Sir Isaac Newton discovered three laws of motion, the second of which deals with this question. Newton's second law is that "action and reaction are equal and opposite," and wherever action happens, we find that this is true.

When a bullet is fired forward from a gun, for instance, the gun gives a kick back, which we call its recoil, and that is its reaction; and if we could compare the weight and the speed of the gun backwards with the weight and the speed of the bullet forwards, we should find that action and reaction were not only opposite, but also strictly equal.

When we run, with elbows bent, we notice how the elbow goes forward as the foot of the same side strikes the earth backward. That is another example of the same thing.

If we push a wall, the wall must push us, and the amount of pressure we exercise on the wall is exactly equal and opposite, in accordance with Newton's law, to the pressure which the wall exercises on us when we run into it.

WHY DOES A BRIDGE SWAY IF MANY PEOPLE KEEP STEP UPON IT?

The swaying of the bridge is really the same as the swinging of a swing, or the to-and-fro movement of the pendulum of an old-fashioned clock. All these *vibrations*—a word which simply means tremblings—obey the same law. Other instances of the same kind of thing may be found in cases where a huge rock, perhaps, is balanced so that if we press against it at the right intervals it can be set rocking, though no living man could move it in an ordinary way.

The secret lies in the time when we apply our force. The bridge is set swaying because many little forces are applied at the same moment. The swing swings well because we give it a little push at just the right moment.

It is the same in games. People think that the man who hits hardest or farthest at tennis or baseball is the best hitter, but that is not quite the case. The best hitter is the best "timer," the man who times the ball, and applies his force at exactly the right moment. Twice the force applied a second sooner or later than it should be would not produce half the result.

HOW LONG HAS LIFE EXISTED ON THE EARTH?

Many answers have been given to this question, but we cannot be certain of any of them. Plainly, in order to answer it, we must dig down till we find remains of the earliest life on the earth, and then we must find how long it is since that part of the earth's crust in which we find the remains was formed.

All this is easier said than done. When it comes to the remains of the very simplest forms of life—and the first forms were certainly very simple—we are often in doubt whether what we find was really made by life at all. Again, we have reason to believe that the very first living creatures would leave no records of any kind behind them.

The simplest animals and plants now existing, which are very likely far less simple than the first forms of life, could not possibly leave behind any traces of themselves. So probably life is much older than the oldest records of it that we can find. How much older, we can guess to some extent, for at least we may be sure that life came into existence after the making of those deep rocks which were certainly formed by the tremendous power of intense heat.

When we have got back to proofs of heat at the earth's surface, so great that the rocks were melted, we may be sure that we have reached a time before life.

The total age of the rocks laid down since that time is not easy to guess, and we have learned since the discovery of radium that all the old guesses made by men of science allowed far too short a time.

At least, we may be quite certain that life must have existed upon the earth for scores, and more probably for hundreds, of millions of years.

OUGHT WE TO BE AFRAID TO DIE?

No animal is afraid to die, but that is because it does not think of the future, and cannot know what death is. A child does not *naturally* fear to die, though we can easily teach it to be afraid. For ages past many men have made it their business, for one reason or another, to teach people to be afraid to die. This applies only to our part of the world. In mighty Asia, where the greater number of all mankind is still to be found, men are not afraid of death. But in our part of the world they are, and for two reasons.

The first is that we are usually taught that death is very painful. This is false. As a rule, the only painless part of a painful illness is the death that ends it. Dying is no more painful than going to sleep. In both cases we slowly lose our feelings, because the amount of carbon dioxide and other substances in the brain prevent it from feeling any more. Nature is most merciful in this respect. It is the rarest of events for a death to be other than a quiet, peaceful going to sleep, from which there is no waking here—a scene painful to the lookers-on, but not at all to the dying person.

Then men fear to die because of "the dread of something after death." Only the wisest of us, and those who believe in their hearts what they profess to believe with their lips, know that "To the good man no evil thing can happen," as Socrates, of whom we read on page 1326, said before they poisoned him. Another great and good man, Spinoza, about whom we read on page 4632, said many words of eternal wisdom and truth: "The free man thinks of nothing so little as death, and his wisdom is a meditation not of death, but of life."

WHAT MAKES US GROW?

We cannot fully explain growth, because growth depends upon life, and we cannot fully explain life; but there are certain laws of growth which we know. The first is that, to begin with, our food makes us grow; this is true of all growth everywhere, whether of a cabbage or a child. Growth is, among other things, the addition of new material to the body.

Now, though life is so marvelous, it obeys the laws of Nature, and we have proved that all living things obey the law that matter cannot be made out of nothing. Therefore, the new matter added to itself by the living body is derived from the food; and that is why the feeding of living creatures while they are still growing is so very important.

This all sounds as if we understood the whole of growth, but that is far from the truth. For in the case of every human being or animal there comes a time when no amount of food will cause growth. There are laws inside the living body which decide when it shall stop growing and a man of thirty will never get any taller, however much he eats. Even a tree, though it may get thicker as long as it lives, will not grow taller after a time.

Mere adding of matter is not growth. A man who is ill, or who eats and drinks too much and does not do enough work, may get heavier and heavier—perhaps by storing up water, perhaps by storing up fat in his body. But that is not growth. *Real* growth is only the outward visible sign of development, as when an acorn develops into an oak; and the causes of development still lie hidden deep in the nature of life.

WHY DO WE LAUGH?

It is not difficult to make many kinds of machines, such as a mouse-trap or a gun, which will "go off" in a particular way when a certain thing is done to them. If we touch a handle or a trigger or a spring, and a certain result happens, it is because the machine is made in that way. Well, our bodies are in many respects made so as to do certain things when certain things are done to them, and these actions, which go on without ourselves having anything to do with them, are called *reflex* actions. The name suggests that they are replies to certain things, as the gun's going off is a reply to a touch on the trigger.

Now, laughing is one of many instances of reflex action; and so, when we are asked why we laugh, the answer

is that, just as the gun explodes when the trigger is pulled, because it is "made that way," so we "explode with laughter," as is sometimes said, when the right trigger is pulled, because we are made that way. In this, and in all other cases of reflex actions, like crying, swallowing, winking, coughing, sneezing, and so on, it is very important for us to learn what the various triggers are, so to speak, which can set the machine going when they are pulled, or, in other words, what are the causes of things that happen.

This is important because it helps us to put things right when any of these reflex actions go wrong. For instance, if we know that disturbance in the ear may cause a cough, we shall remember to look at the ear when there is a cough whose cause we cannot trace.

Is it good for us to laugh?

The old saying, "Laugh and grow fat," suggests that it is good for us to laugh, though perhaps growing fat is not the best proof of that. At any rate, it is perfectly true that we do derive some benefit from laughing. To put it more generally, it does our health and lives good to be happy, whether we actually laugh or not. As Herbert Spencer put it long ago, "Every pleasure tends to raise the tide of life, and every pain tends to lower it."

This can be proved in detail by careful study of the different things that the body does. For instance, happiness strengthens the beat of the heart and deepens the breathing. If food is eaten with pleasure, in good company, and with an easy mind, plenty of the digestive juices pour into the stomach, and the fluid, when examined chemically, is found to contain a high proportion of ferments by which digestion is done.

On the other hand, digestion does not go on nearly so well if we are not happy; and it is known that often, when people are really worried or unhappy, either the stomach will not keep the food at all, or, if it does, no digestion occurs. In great sorrow it may actually be impossible to swallow even liquid foods.

Laughter has a special value of its own, for it is a kind of exercise of the most important and valuable muscles in the body—the muscles by which we breathe. And this extra deep breathing not only exercises the muscles of the chest, but also, indirectly, exercises the heart. It also means that more oxygen passes into the blood, and that the blood, richer than usual in oxygen, is carried more quickly than at ordinary times to the various parts of the body.

Is it bad for us to cry?

Crying may be good or bad for us. When some terrible sorrow has come upon people, they may be so deeply affected that the brain refuses to do what is natural for it in such circumstances, and it may be severely injured. If by any means the person can be got to cry, he or she will be relieved, and may be able to sleep; but if that relief is not got by crying, the person may be unable to eat or to sleep for a long time, and the brain may be so much injured that it never properly recovers. One of Tennyson's most beautiful poems deals with this subject. It begins:

> Home they brought her warrior dead:
> She nor swoon'd, nor uttered cry:
> All her maidens, watching, said:
> "She must weep or she will die."

Then the poem goes on to say how, when everything else had failed to make her weep, a wise old "nurse of ninety years" brought to her her child; and then at last she wept and said:

> "Sweet my child, I live for thee."

But cases like this are quite the exception, and there are other cases when crying does us no good at all. On the contrary, it disturbs the most important duties of the body, especially by its effect on the part of the brain which controls our breathing.

Everyone knows that when we cry our breathing is made irregular with many shallow breaths that do us little good, and then long, sighing ones to try to make up for them. Also, we find that the heart's beating is apt to get irregular when we cry, and many people after a serious attack of crying can neither eat nor sleep. A little crying at times does not hurt a baby in the least.

Why are not lead, coals, and diamonds all the same price?

Lead is a metal and a true element, different from everything else. For some stupid reason, pencils filled with a certain kind of carbon are called lead pencils. Carbon, like lead, is a true element, and it is found in many different forms. The kind of carbon put into so-called "lead" pencils is called

graphite, from a Greek word meaning to write. It is made up of a vast number of very small crystals of a special shape; but these crystals are not particularly hard, and so they can be rubbed down on paper. Graphite is found in nature, and can be made without difficulty from other kinds of carbon.

Coal and diamonds are also made of the same element—carbon. It is not difficult, by heating them, to turn diamonds into what is practically coal. The hard crystals make the diamond swell up, turn black, and there is produced a shapeless black mass of charcoal.

Now, the price of things does not go by their use. Coal and graphite are far more useful than diamonds. But diamonds are difficult to find. Their price is kept up by the fact that the supply of them is nearly all in the hands of one company. Large ones are very rare, and are much sought after. If they were less liked, they would be cheaper. Coal, charcoal, and graphite can be turned into small diamonds which no one cares to buy. The price of diamonds would fall to the price of pencils if they could be cheaply made from other kinds of carbon.

WHY DOES A HOUSE BECOME VERY DUSTY IF WE LOCK IT UP FOR A YEAR?

The air is simply laden with large and small particles of dust. These are the "motes that people the sunbeam." We see a sunbeam because some of its light is stopped by the particles of dust in the air, and is reflected from them to our eyes. It is really dust that we see when we think we see the sunbeam.

Now, if air is kept perfectly still, these particles of dust will slowly settle. They are not very heavy, as we can understand when we find how readily they are kept up in the air. But, nevertheless, they are heavier than air, and in time they must certainly fall if the air becomes quite still.

So if we pass a beam of light through such a place as a cellar, where the air has long been quite undisturbed, we actually find that it is quite invisible. That is because the dust has all settled down out of the still air in the course of time, and it explains why a house becomes so dusty when it is locked up.

The air being still and unchanged, and no light entering, probably no new dust is made, or very little; but the dust which was in the air simply settles. When it was in the air we did not notice it, but now we do. We breathe in many millions of tiny dust particles with every breath we draw. If we breathe through our noses, the greater part of the dust that is in the air is prevented from reaching our lungs.

WHY DO PLANTS GIVE OUT OXYGEN ONLY IN THE DAYTIME?

The oxygen which plants give out is not derived from any source in themselves, nor does it come up in the sap from the roots. If that were so, it might be given off at night as well as in the daytime. But all the oxygen given out by plants comes from carbon dioxide, which is an extremely firmly-made compound of carbon and oxygen.

There is always a certain amount of carbon dioxide in the air—about three and a half parts in ten thousand parts of air—and this is where the plants get the carbon dioxide from. But the great power with which the carbon and oxygen are united, of course, requires a power at least equally great in order to separate, or to *dissociate*, them, to use the proper word. There is no power in the plant itself strong enough for this, but the tremendous power of sunlight is strong enough, and the plant really plays merely the part of taking the power of sunlight in such a way as to force apart the atoms of carbon and oxygen in carbon dioxide. When daylight fails, therefore, this process must cease.

Though we say that all the plant does is merely to use the sunlight, yet we should also add that this is more than we can do. No matter how strong the light that we use may be, or what devices we employ, we cannot with any amount of trouble separate the elements in carbon dioxide, as every green leaf can do without any trouble at all.

WHY DO RIPE FRUITS TASTE SWEET AND UNRIPE FRUITS TASTE SOUR?

The difference is due to the fact that the chemical substances found in ripe fruit are very different from those in unripe fruit. It is not easy to find out the exact details of what happens, but we know that the ripening of fruit is really a steady series of chemical changes, as definite as if we were going through a process of chemical manufacture.

In unripe fruit, and, indeed, to some extent in nearly all fruit, we find a large number of acids. They are acids in the

strict sense of the word as used by chemists, who are not concerned with their taste, but with their chemical make-up and behavior; and also they taste acid. *Malic* acid, which comes from the Latin name for an apple, is found in sour apples; *citric* acid is found in oranges and lemons and limes.

As the fruit ripens, we find that certain powers in the plant, usually aided by the power in sunlight, cause chemical changes to occur in the fruit-acids. Probably oxygen from the air is combined with the acids, burning much of them away, or, at any rate, completely changing them.

In their places we find, in varying quantity in different fruits, a much more complicated substance than any fruit-acid. This is called fruit-sugar, and the special name of it, derived from the same Latin word as the word fruit itself, is *fructose*. It is sweet to the taste, just like other kinds of sugar.

How is it that a man can walk along a wire?

If the question had been, why are we able to stand and walk, though our feet are so small compared with the rest of our bodies, the answer would have been the same. In every case our bodies are top-heavy, and if a man, standing on a wide space, or, what is more difficult, a thin wire, sleeps or faints, he tumbles.

This fact shows us that, though the wire-walker is very clever, and does what we cannot do, yet his feat is really no more than a rather more difficult instance of the feat we perform ourselves every day; and the explanation of the one will be the explanation of the other. The wire-walker learns by practice, just as a child does when it learns to walk on the ground, and both learn the same lesson. They use their eyes, their feeling of pressure on the feet, and also other feelings that they get from special places, made for the purpose, inside the skull, which help greatly to tell them exactly where they are.

The wire-walker, if he be very clever, has perhaps a specially good brain by nature for this kind of thing, but he attains his skill through practice, training, or education, and the secret of his success is the secret of all the most successful educations—its foundations are laid in youth, when the brain is capable of learning almost anything.

Why does our hand lose feeling after an accident?

There are many kinds of possible accidents which may make the hand dead to feeling for a time, and yet the hand may completely recover. The most marked cases of the kind are easy to understand. Feeling in the hand depends upon its nerves; it depends also, of course, upon the brain, but it is necessary that the nerves shall be there and working properly to carry messages to the brain, as well as that the brain shall be well and able to receive them when they arrive.

An accident made by some cutting instrument may simply cut through the nerves of the hand. It may, for instance, cut through the nerve which we call the funny-bone, and then there will be no feeling in just those parts of the hand which give us pins and needles when we hit our funny-bone—that is to say, the little finger and the side of the finger next to it. The nerve we call the funny-bone supplies the skin in those places, and also along the inner edge of the hand. If this nerve is severed, these parts are dead to feeling.

How does an injured hand recover its feeling?

Though our hand may have been dead for a long time after an accident, perfect recovery may be obtained. As a rule, this requires an operation. The surgeon simply finds the two ends of the cut nerve and stitches them together. At first, this makes no difference at all, but in the course of weeks, as the wound begins to heal, the feeling will gradually return.

What happens is that the nerve-fibres, beyond the place where the cut occurred, have died and are useless, but when the cut ends are sewed together, the nerve-fibres next the brain, which are unhurt because they are still in communication with the nerve-cells from which they spring, grow slowly downwards into the old sheaths, and so at last the nerve can do its duty properly.

The invariable rule is that the part of a cut or damaged nerve which is away from the nerve-cells dies, but the part which is next the nerve-cells in the brain, or in the spinal cord, lives, and, if it has the chance, will always grow again along the old lines.

WHY DO FIELDS APPEAR TO MOVE WHEN WE ARE IN A TRAIN?

When we sit still in a train, we notice that, compared with the seats and walls of the carriage, our bodies are not moving, and so we half get the idea into our minds that we are really at rest. Then, as we look out of the windows, we keep in our heads, more or less, the notion that we are at rest, and therefore we argue that the results of the motion, which is certainly going on somewhere, are due to the fields, and so on.

This is one of countless instances where we are deceived, and all these instances teach the same lesson—that our ideas of motion are made of comparison between one thing and another; but which thing is moving, or moving most, is another matter. The proper way of expressing this is to say that all our notions of motion are relative, not absolute.

A train gives us another instance, for we all know that we may be deceived when there is a train on the line next ours. Often we cannot tell which of the two trains is really moving. But by far the most famous and important mistake of this kind that has ever been made is the case of the earth and sun and the stars. In our train, which is the earth, we move every day and night, and the fields of the sky, with their white flowers, the stars and the mighty sun, seem to move across our path and pass us.

We make the mistake the eye makes when we look out of a train; and it cost hundreds of years and vast trouble and many lives to prove that it is *our train*, or the earth, that is moving.

WHY DO WE WANT ALWAYS TO RUN DOWN A STEEP HILL?

If we could see the earth as a great ball, we should notice the hills as places where the surface of the ball sticks out. It is rather like an old composition golf-ball that has grown rough. Now, plainly, in such a case anything on the top of a rough place is farther from the centre of the ball than anything lying in the hollow between rough places.

The case of the earth is the same. When we are on the top of a hill, we are farther from the centre of the earth than when we are at the bottom of a hill. The earth's attraction, which we call gravity, is always trying to pull us and everything else as near as possible to the centre of the earth. So when we start going downhill we do not so much drive ourselves as allow ourselves to be pulled by the earth's power.

We notice this best, perhaps, when we coast downhill on a bicycle; but it is just as true when we are on our legs, only that we cannot roll as the bicycle wheels do. So our natural inclination, if we are not afraid of hurting ourselves, is to yield to the earth's pull and run downhill. The natural inclination is really in the earth, perhaps, more than in us, as the case of the bicycle mentioned, which has no inclination of its own, shows.

If the road is fairly good, and we are not too heavy and are sure of our feet, we may go downhill very easily and with very great speed, by keeping the upper part of the body well forward, so as not to resist gravity, and by making large bounds rather than running.

WHY DOES FURNITURE CRACK OR MAKE NOISES AT NIGHT?

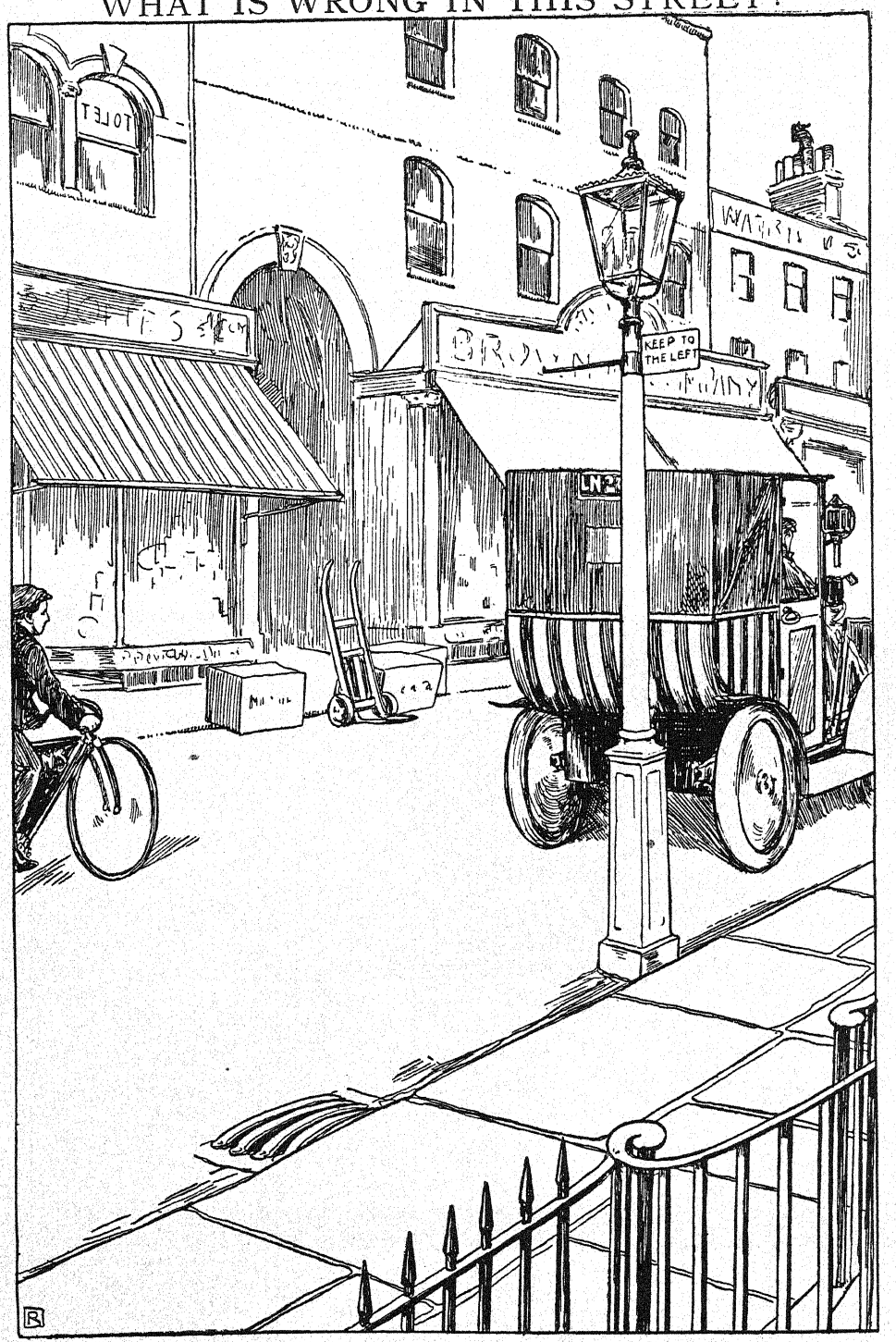
Perhaps we cannot be quite certain that furniture cracks so much more at night than in the daytime. For one thing, there are other noises going on in the daytime which we are more likely to be attending to; for another, it is known that when we lie awake at night in the dark, our hearing is more acute than it usually is in the daytime. Still, when all this is allowed for, it is no doubt true that furniture does make strange noises at night, and that is not difficult to understand if we remember that the air has been warmed up, more or less, during the day, and then cools down at night.

The general rule, which is true of wood as it is of most other things, is that things expand as they are heated and shrink as they are cooled. Thus furniture is liable to shrink more or less at night as it cools, and we can understand how different parts may suddenly become adjusted to each other, and so start the waves in the air which make us say that the furniture is cracking.

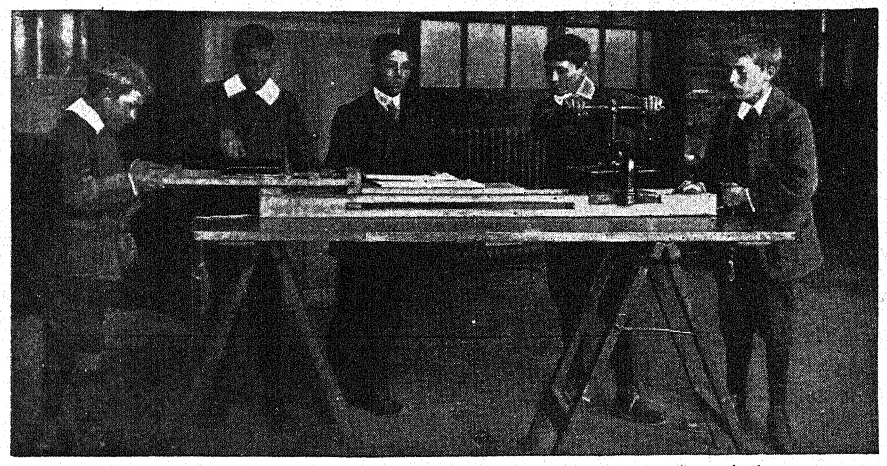
The question of moisture may play a part, too, because as air cools it is apt to deposit the moisture which it could hold in itself when it was hotter, and that moisture is apt to affect the state of whatever object it is deposited upon.

THE NEXT QUESTIONS ARE ON PAGE 4873.

WHAT IS WRONG IN THIS STREET?



When we take a walk in the country or in town, we should make a point of noticing the objects that we pass. This practice is an excellent one for training the mind, and many improvements in city streets had their origin in ideas that have come to people walking along with their eyes open. In this picture the artist has purposely drawn many things incorrectly. A list of the things that are wrong will be found on page 4931.



A group of schoolboys printing their school paper upon a small wooden printing press.

STARTING A SCHOOL PAPER

CONTINUED FROM 4713

A SCHOOL paper cannot well be undertaken by one person alone. There are so many different things to be done, and so many of them call for special aptitude, that the work is best accomplished by a division of labor.

If we are going to run a school paper, we must take care to select our helpers in such a way as to ensure all branches of the work being really well done.

The work can roughly be divided into four main parts, which we may call the writing, the drawing, the printing, and the selling. A school paper may be founded by four friends, each of whom will undertake the charge of one of the above departments. We have said four friends, for much of the success of the venture depends upon the firmness of the friendship which exists between the founders. Nothing demands more unity of action than the production of a school paper.

Let us consider these four friends and see what qualities fit them for the posts they will occupy. The editor is of necessity the chief; he must be a good scholar—so good that none of his schoolboy critics will be able to pull him to pieces. He must also be on fairly good terms not only with his schoolfellows, but also with his teachers. These latter will be of the greatest assistance to him, not only in furnishing occasional articles, but also in influencing the circulation. One of the teachers of a literary turn of mind might be persuaded to look over the manuscript articles submitted, and correct the grammatical blunders which might otherwise be passed over by the youthful editor and so get into print.

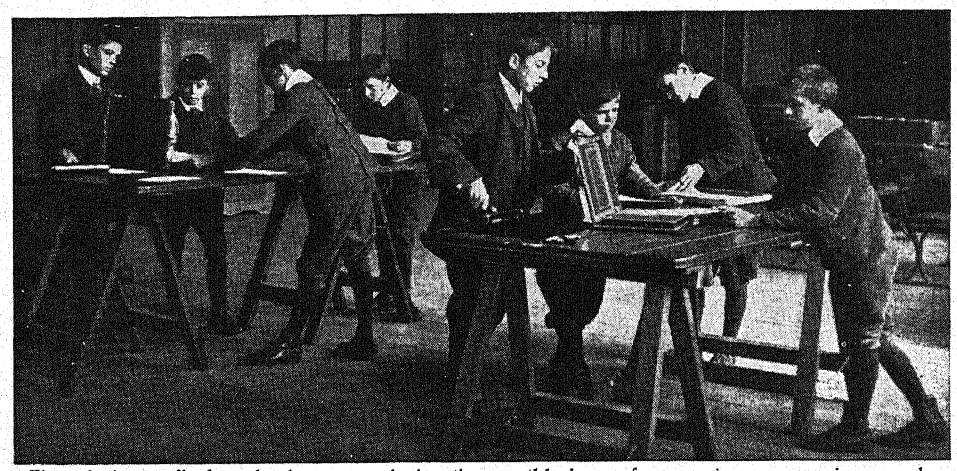
The second position, that of art editor, is nowadays an easy post to fill. Most schools of any size possess a fair share of pupils who can draw well, and from among their number a suitable editor can be chosen.

The third position will be that of foreman printer, and whoever fills this post will generally have the whole of his business to learn. Much of the hard work will fall to his share, so that great care must be taken to choose as printer one who possesses a full share of diligence, and who is really fond of working with his hands.

The fourth editor will be head of the distributing department, and must, above all things, be a genial fellow—one who is on good terms with everyone. He will have to help with the printing, so that he must also be willing to work when needed.

The first question that the founders of the school paper will have to decide will be the method of printing. Printing with type may be impossible because of the expense. If so, some form of duplicator must be bought or borrowed. Should there be such a thing as a school mimeograph, the principal may be prevailed upon to allow its use. Failing this a hectograph will be found a cheap and easy means of reproduction, and will, if rapidly manipulated, give eighty to one hundred clear copies from one original writing or drawing. The hectograph composition can be bought in cans, and when melted may be poured into any shallow tray.

The question of printing being thus settled, arrangements must be made for obtaining paper. Foolscap or other papers used for educational purposes will be found too expensive, and the local newspaper or printing office may be willing to sell the small quantity needed. The size of the



The printing staff of a school paper producing the monthly issue of 350 copies upon a mimeograph.

school paper must be governed by the size of paper you can buy and by the size of your hectograph. Sheets measuring about twelve inches by nine inches will be found both economical and handy, and when folded in two will give a page of six inches by nine inches.

The subject-matter will vary with the taste and capabilities of the staff, but certain regular features will probably be common to many school papers. We have already alluded to the desirability of co-operating with the principal, and this can best be accomplished by offering them a page or two of space for school notes. Few schoolmasters will refuse such an opportunity of awakening outside interest in school doings.

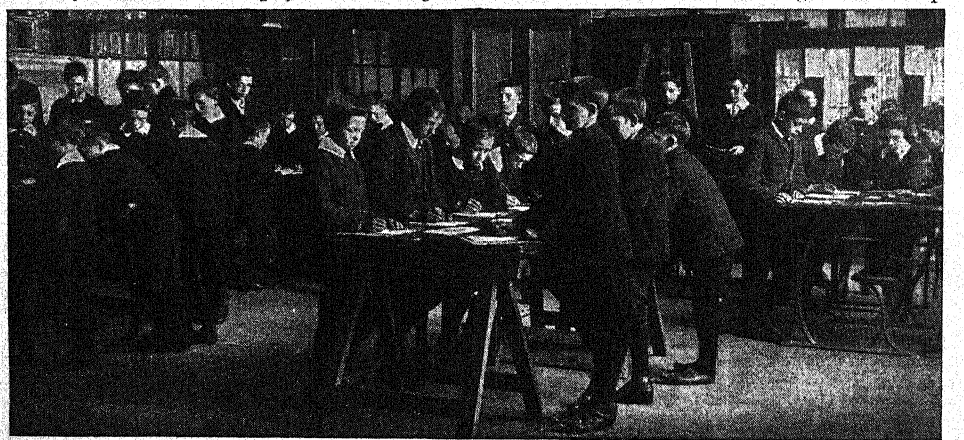
After school notes the most important feature will probably be school sports. These can be supplied by the various captains or secretaries, and in schools where directors take charge of sports a timely article on training, fielding, diving, and so on, will be found of general interest.

Here will be ample opportunity for the art editor to introduce a few sketches. Tiny illustrations in the margins take but little time, and help to make the pages look bright. Nature notes of the month and local history are sure to be subjects which are not only full of interest, but are easily written up, either by enthusiasts or by the editor with the help of a few books from the nearest library. Playground gossip will give opportunity for some harmless fun, but our editor must be careful that the fun does not degenerate into unkindness. He must remember that while we should all be able to stand a joke, it is cruel to continually hold anyone up to ridicule.

Now for a word as to printing. At first it will be as well to write the matter in the form of a book, so that the difficulty of arranging pages is approached gradually. After a time the editor and printer will get to know just what the page will hold, and no difficulty will be experienced. Sketches will be more effective if printed in ink of another color, and, fortunately, hectograph ink is made in several colors.

The future of the paper will depend entirely upon its circulation. The price should be fixed so as to be easily within the spending powers of every schoolfellow, and the distributor must endeavor to secure every boy in the school as a subscriber.

Should the circulation outgrow the dupli-



Here we see the boys coloring the pictures in an issue of their paper that is printed ready for publication.

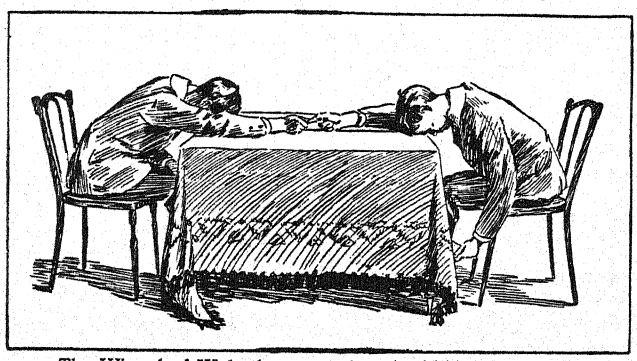
cating powers of a hektograph, the profits will easily purchase a second-hand mimeograph. The price for such a machine will not be great, and there is no limit to its duplicating power if it is skilfully handled.

Additional helpers may, as need arises, be drafted into the scheme, but the editors must take care to enlist only enthusiasts. Apart from the pleasure which the "power of the Press" gives, our founders will find their newspaper experiences will unconsciously afford them an elementary business training which will be of value to them in after life. The photograph on page 4820 shows schoolboys engaged in printing a monthly issue of three hundred and fifty copies. In this case the illustrations are colored by hand, and the business side includes such officials as time-keepers, storekeepers, clerks, and so on.

Such an organisation is, of course, a matter of time, and we may be sure that our paper, if started in the right way and with the necessary enthusiasm, will grow into quite a prosperous and up-to-date journal.

THE WIZARD OF WABASHA

THE trick known as the Wizard of Wabasha is of the mind-reading or thought-reading variety. If cleverly done it is really wonderful and very puzzling. You tell the audience that even their thoughts are not hidden from you, and you invite one of them—the most incredulous for preference—to come forward and let you prove that it is so. You give him a piece of paper and ask him to write upon it any three questions he likes, and after he has done this you request him to double the paper lengthwise, then to fold it again lengthwise, and then to double it across its length. It will then be a small folded slip. You ask him to hold one end of the folded slip firmly between his forefinger and thumb and you take hold of the other end firmly between your forefinger and thumb. You lead your friend to a table and ask him to sit down on one side of it while you sit down on the opposite side. You have both been holding the folded paper firmly—one each end of it. Upon the table you have already placed a ribbon or leather belt or even a piece of string. Any one of these things will do, as they serve no real purpose, but only make an excuse for you to get your companion to do what follows. You explain to him and to the audience that you have the marvelous power of reading his thoughts when you both put your foreheads on the table right on the ribbon or belt or string. Then, if he will think intently upon the questions, you will find out what these questions are, and you will answer them.



The Wizard of Wabasha answering the hidden questions.

When both of you have placed your heads upon the communicating band, you assume the appearance of deep thought, and if possible of mental anguish, and finally tell him one by one what his questions are and invent some answers for them. Then, when you have answered his three questions, you release the paper and ask him to open it and show it to the audience as proof that you read correctly the questions he had written.

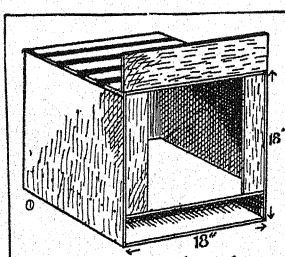
Now for the explanation of how the trick is done. You have two pieces of paper, one folded exactly as you are going to tell him to fold his, and the other unfolded. You give him the unfolded one, and when he has written it and folded it exactly as instructed you take hold of one end of it. But, hidden away in the palm of the hand that holds his paper, you have the other paper folded in exactly the same way. As you lead him to the table you contrive to make him lose hold of the paper for a second, and when he grasps it again you put between his finger and thumb, not the same piece of paper, but the other or blank piece. Upon this movement depends the success of the trick. Boldness and a ready flow of talk will help you very much by diverting attention, and no one, least of all the writer of the questions, will imagine that the paper now held is not the one containing the questions.

Having succeeded thus far, it is not difficult to put your other hand—your left one—up to your right, and, unseen by the audience, to take the paper with the questions. Then you sit down at the table, and as you have arranged that both of you place your foreheads on the table in order that the thought-reading may be successful, you have the opportunity to read the questions on his paper, which you open with your left hand. The picture shows a young conjurer at this stage of the trick.

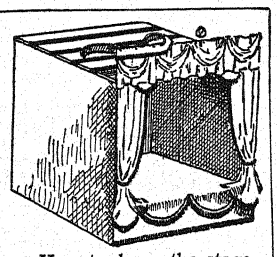
After you have read the questions, you have to replace the right paper again. This is rather more difficult than the former exchange was, because you have not the movement of walking to the table and sitting down to cover your actions. Still, you can manage it. As his forehead is on the table, he cannot see your left hand move up to your right to place the paper in it, and as your left hand is the one farthest from the audience, your right arm will help to conceal the movement. To replace the paper you should not wait until you have answered his questions, but should do it as soon as possible after you have read them.

BUILDING A MODEL STAGE

TO most of us the theatre is a perfect fairy-land, peopled by all sorts of wonderful beings in all sorts of marvelously colored dresses. They are like people who have walked out of dreamland for a little while to amuse us poor folk on earth. There is no reason why we should not all have a theatre of our own that we can play with at home. All we need do is to make a toy stage with toy scenery and toy actors and actresses. The more brilliant among us may even write short plays, and entertain our friends by giving performances upon the stage that we have made with our own hands. We shall now proceed to show how to make our stage and little men and women.



1. The stage undraped.


2. How to drape the stage.

The frame of our little stage will be made from a rough box. The front opening may be of any convenient size, depending on the size of the box at our disposal. It should be not less than eighteen inches wide, however, and eighteen inches is a good height. The stage is raised from the ground two inches. The top is made of strips of wood stretching from side to side, with a space of one inch between the strips. It is through the openings between the wooden strips that we let the scenery and also our actors and actresses descend upon the stage when the right time comes.

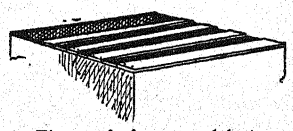
Now we nail to the top of our stage a front board, as seen in picture 3. It may be four to six inches high, and it must go from side to side. Its purpose is to hide the movements of our hands as we manipulate, or work, the scenery and the figures.

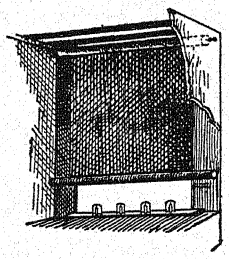
Our next task is to make the footlights, which are essential to any stage. The footlights must not be seen by the audience sitting in front of the stage, so they must throw out no light towards the front. Their light should be thrown entirely upon the stage, the scenery, and the actors and actresses.

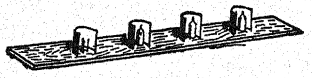
The simplest footlights are candles. They must not be very long, and as we want them to last some time we should select short pieces of good, thick candles. If we get a few carriage candles and cut them into sections about two inches long, they will do very well. We make our candle reflectors from pieces of tin, about four inches square, bending each piece into a curved shape, as in picture 8. To fasten the pieces of tin to the floor in the front of the stage, we can make a few holes in the tin by driving a nail through them, and then tie the tin pieces to tacks or nails driven into the wood. We place a candle behind each tin reflector. We can stick the candles on to the wood by allowing a few drops of candle-grease to drip from a lighted candle, and then put the candle in place while the drops of wax are still hot and liquid. If we wish to make them still more secure, we can put in three wire nails about one inch long with the points sticking up a bit. The candles will fit between the nails seen in picture 8. The reflectors and the candles behind them may be placed four inches apart from each other. The sides of the reflectors which are next to the audience may be painted the same color as the stage hangings that we are now about to consider, or they may be covered with colored paper so as not to allow the tin to be seen by the audience.



3. Shape of the front board.


4. The roof of our model stage.


5. The drop curtain partly raised.


6. Row of footlights.

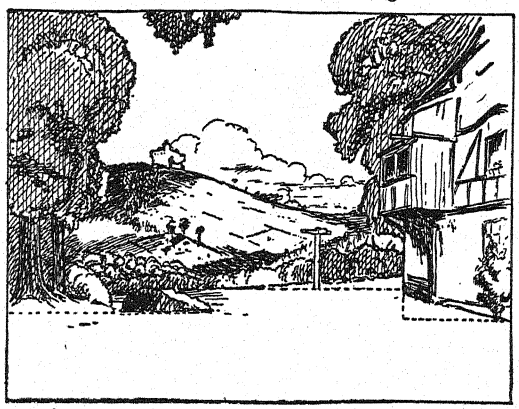

7. Curtain roller. 8. Tin reflector.

To drape our stage in front, as seen in picture 2, we may use any cheap fabric that gives a good effect, and we can usually find about the house some remnant that will serve our purpose. If we have to purchase the cloth, a yard of sateen, or other similar cloth, will provide all we need. Any nice color, such as blue, green, crimson, or old gold, will do. We attach the hangings with tacks, taking care to let the top hanging fall down below the roof for one or two inches, and to make the sides full, so that there will be no opening between the sides of the stage and the sides of the drapery.

A drop curtain is not absolutely necessary, but every proper stage has one; so if we wish to be quite up to date we shall make one for our stage. To make it we require a piece of cloth, the color of which may be the same as the cloth used for

the drapery that we have already put up. The size of this curtain will be three inches less than the size of the stage from side to side, and in the other direction it will be the same size as the height of the stage from the floor to the top.

To hang this curtain, the best method is to have two thin wooden rollers half an inch shorter than the exact width of the stage inside. We fix the top of the drop curtain to one of the rollers by tacking the edge to it, and we attach the bottom of the curtain to the other roller in the same way. Now we make two holes in the side of the box just opposite where the centre of the upper roller is to be, and we drive two wire nails through these holes into the centre of the top roller at each end, as shown in picture 7 on page 4822. The nails should be thin, so that they may easily turn round in the holes in the stage wall. We next fix a cord to the end of the top roller and wind it round and round like a window-blind cord, taking care to keep it as far away from the stage wall as possible. The curtain from the inside of the stage will look like picture 5, which helps to explain how to make and fix it. By pulling the end of the cord the curtain rises, and by unfastening the end of the cord the curtain falls. The free end can be looped and put over a tack driven into the side of the stage at the back, thus keeping the curtain up when it is necessary to do so.

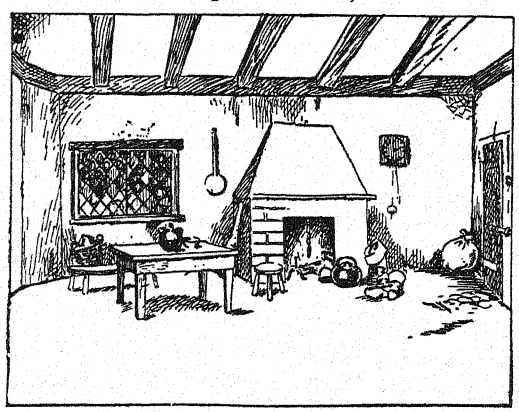


9. A typical piece of woodland scenery for the stage.

Now we shall make a back scene, or more than one if we wish. The easiest way is to have a sheet of cardboard and to draw and paint on it a picture, making the colors strong, as it is to be viewed from a distance and under artificial light. This cardboard scene should be the size of the back of the stage. We may have a different scene on each side of the cardboard, so that by reversing it we can change the scene. It is possible to make back scenes on hanging cloth, or canvas hung on rollers just as the drop curtain was hung. This way is very much better, but it involves a little more trouble to give it the proper effect.

We should make a variety of side scenery, such as trees, pieces of landscape, parts of houses, and many other ornamental things, and there is plenty of room and scope in making these for the exercise of both artistic skill and of ingenuity. These side scenes should be drawn and painted on cardboard just a little taller than the stage, and they must be put into position through the cross-pieces at the top of the stage, where they rest without moving until we wish to change the scene by withdrawing them. These side scenes, after having been drawn and painted on cardboard, should be cut out so that our audience can see beyond them. If they are made of good, thick cardboard, they may be stiff enough, but if of thin cardboard it may be necessary to glue thin slips of wood or stiff cardboard to the back, so that they can be made comparatively rigid. Pictures 9 and 10 on this page show pieces of typical scenery which may be copied, making them of a size suitable for our stage. Set pieces are also desirable.

We have now only our actors and actresses to make. We can draw them on cardboard, but an effective and perhaps a lazy way is to take scrap pictures, stiffening them by pasting them on cardboard if necessary. Then we hang them on wires, which must be long enough to reach from the roof. Flower wire will do, or the wires from soda-water bottles. The wires can be bent round at the top end so that they can hang over the strip of wood forming the roof. We can make actors and actresses from clothes-pins as shown on page 4495.



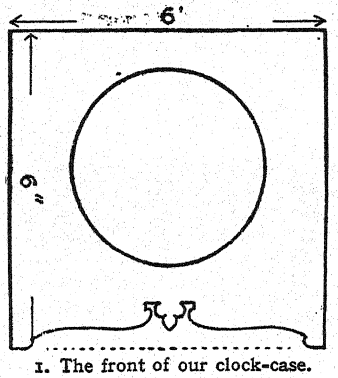
10. This scene shows the interior of a country cottage.

We are now ready to give our theatrical performance. We put our scenery in position and hang our figures on the wooden strips over the stage at the far sides, where, by manipulating the top ends of the wires, we can make them walk on to the stage as we require their presence. The words of the play can be recited by the player, and he must take care to change the tones of his voice to suit the style of character he is trying to imitate. It is essential that, before making a public performance, we should have several rehearsals, so that the play will be sure to proceed without a hitch of any kind. We should always remember the old saying that when a thing is worth doing it is worth doing well.

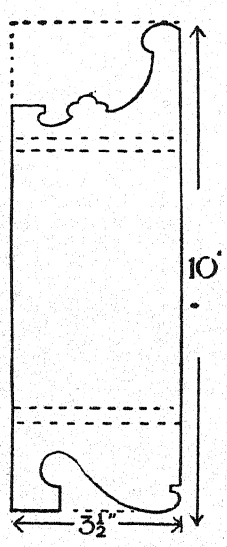
AN OAK CASE FOR A CLOCK

THERE is a variety of clock, with a nickel-plated metal case, that is very cheap, about one dollar being sufficient to purchase one that keeps good time. It is possible, with very little trouble and expense, to make for such a clock an ornamental oak case that will transform it into quite a handsome piece of furniture.

We need some pieces of seasoned oak about half an inch thick, but we may remember that any other wood will do as well. We have chosen oak only because it happens to be a wood that looks well without a great deal of polishing, and because it is inexpensive. We shall, first of all, make the front of our clock-case. It requires a piece of wood six inches square. With a pair of compasses we draw upon one side of the wood a circle of the same size as the dial of the clock, and then we cut out the circle as seen in picture 1. The best way to cut this circle out is by using a fret-saw. If we do not happen to have a fret-saw, we can purchase one for twenty-five cents, and we shall find this little tool very useful indeed for the task we have undertaken. In using the fret-saw we should be careful to cut straight and not saw crookedly. Then, still carefully using our fret-saw, we give to the front piece the form of ornamentation at the bottom that we see in picture 1.

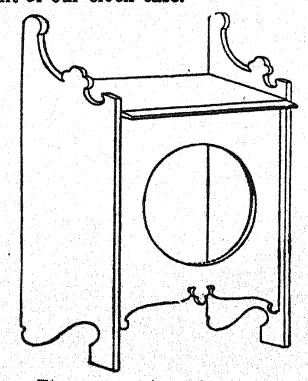


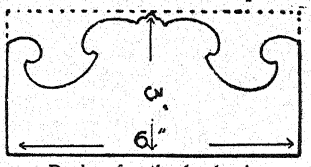
1. The front of our clock-case.



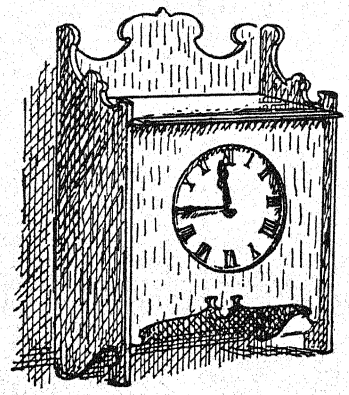
2. Shape of the sides.

Now we shall commence to make the two sides, cutting them out with the fret-saw from pieces of wood measuring ten inches long by three and a half inches wide. Both sides must be exactly alike. The design is seen in picture 2. Before gluing and nailing the front and the sides together, we must make the top from a piece of wood six inches long and four inches wide, and put a plain bevel in front. This goes below the ornamental part at the top of the side pieces, resting on the top of the front piece, and projecting about half an inch in front, as seen in picture 3. We have yet to make the back piece for the top, the pattern of which should be suitable for the fret-saw, and also in harmony with the design of the sides. This piece is seen in picture 4. We must draw the design carefully upon the wood, and then cut it out, taking great care that from the middle to one end is exactly the reverse of the pattern from the middle to the other end. When we have put on the back top piece, as seen in picture 5, we have nearly finished the part of the clock-case that will be exposed to view when it is in position on the mantelpiece. But we have still a bottom piece to make, and finally a door for the back. These need not be of oak or the wood that we have used for the pieces already made; so if we have any odd pieces of wood that will suit, we may as well use them. We must fit the clock in its case, and that will enable us to see exactly where the bottom should be. The bottom will be made just wide enough to come even with the side pieces at the back, and will be about three inches wide. Then we make and fix on a door at the back with a pair of small hinges, taking our size from the opening. Our clock-case is now quite finished.


3. The case without back piece.



4. Design for the back piece.


5. The completed clock-case, with clock.

It is much better for all the joints to be carefully glued in addition to being nailed; and we should have the glue quite thin, as this is always easier to manipulate and also holds much better than thick glue. If the wood used for the clock-case has been mahogany or walnut instead of oak, we may like to French polish it in the manner described on page 2873. We may, however, if we prefer, enamel the clock-case instead of polishing it, especially if it is made of a light wood, when it will be found very suitable for a bedroom.

THINGS TO MAKE WITH FOLDED PAPER

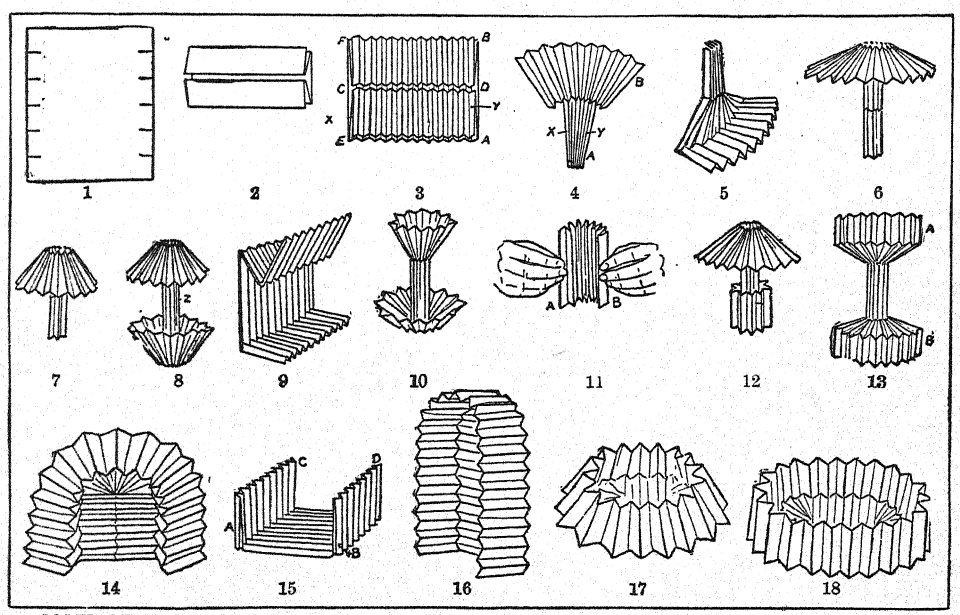
A VERY great deal of amusement and enjoyment can be obtained from a plain sheet of paper measuring, say, 30 inches by 24 inches, or a smaller piece of somewhat similar proportions. No other apparatus is needed; and yet, by simply folding the paper and then opening it out in different ways, about a hundred different things can be formed. With a little practice we shall get skilful in folding and unfolding the paper; and we can then give quite an interesting entertainment to our friends, causing them a great deal of astonishment and delight. Or, if we are a guest at an evening party, we can "make things go" with the same simple apparatus.

It is advisable to take a large sheet of paper of the size mentioned, 30 by 24 inches, as the folding is not then so tedious, and it is simpler to manœuvre the paper when folded. But if such a sheet is not available, then the experiments can be carried out with a sheet of notepaper cut to the right proportions or thereabouts. Having obtained our sheet of paper, let us mark off on each side six equal parts, as shown in figure 1, and fold the paper as shown in figure 2. Now, by making small neat folds backwards and forwards alternately in this sheet of paper, which is already folded into three thicknesses, we have it like figure 3, and are now ready to make a great assortment of objects.

By nipping together the end of the folds at A, as in figure 4, and spreading out the top, B, we get a fan. The next figure, 5, is obtained by inserting the finger at the point C of figure 3 and moving it along under the folds to D. This pulls out a row of fluted folds; and by holding at A as for the fan, but inverting the paper, we get a bracket.

Now hold the same way up as for the fan, and, keeping the upper folds that formed the shelf of the bracket spread out horizontally, bend round the small folds marked X and Y in figures 3 and 4 until they meet at the back. We shall then have an umbrella as in figure 6. By moving the shade part of the umbrella to a sharper angle, we have the toadstool in figure 7.

Draw out the lower row of fluted folds like those that form the top of the toadstool, and twisting the folds of the stem, Z, round as for the toadstool, we get figure 8. Now pull out another row of folds at the top, as in figure 9, draw the centre folds together again, and we have figure 10 in its place.



SOME OF THE MANY THINGS THAT CAN BE MADE BY FOLDING A PIECE OF PAPER

1. The paper marked for folding. 2. The first folds. 3. The paper folded. 4. Fan. 5. Bracket. 6. Umbrella. 7. Toadstool. 8. Candlestick. 9. How the folds are pulled out. 10. Vase. 11. How the stems are formed. 12. Lamp. 13. Dumb-bell. 14. Porch. 15. Newspaper-rack. 16. Sentry-box. 17. Jelly-mould. 18. Bowl.

If there is any difficulty in forming the stems and stalks and getting the distended folds to form into round shades and cups and so on, figure 11 will make it clear how this is done. A and B are the end folds on each side of the concertina-like sheet of paper, and these are drawn round at the back till they meet. This has the effect of twisting all the folds round, so as to form a shade for an umbrella, the top of a toadstool, and so on.

Figure 12 shows a lamp; it is a slight variation of figure 10. By drawing out the bottom folds the same as those at the top in figure 8, and then twisting the stem round as before, we get figure 13. Now, keeping the paper in this form, take the ends of the folds A and

B between the fingers and draw them together. This will give figure 14—a kind of porch. Place the paper as in figure 15, and we have a newspaper-rack. Draw A and B together, and we have a sentry-box—figure 16. By drawing together not only A and B in figure 13, but also C and D, we have a jelly-mould as in figure 17; and without changing anything, but simply moving our hands farther apart while we hold the jelly-mould, we get a bowl or vegetable-dish as in figure 18.

These are only a few of the many shapes and figures and models that we can make from a plain sheet of paper. Once we have the paper folded as in figure 3, we can keep inventing our own designs; and when we have become expert and skilful in the use of a paper folded into the sections shown here, we can still further elaborate the folds, and get even more astonishing models.

A number of points should be carefully borne in mind. In making the backward and forward folds to prepare our sheet of paper, it is essential to make small and neat folds. If we make wide and clumsy folds, the paper will not have the elasticity that will lend itself to a great variety of shapes and twistings. It is therefore well worth while to take considerable pains to get our paper nicely folded in the first place. Another point to remember is, if we wish to be successful as an entertainer with the magic folding paper, we must, after making one figure or series of figures, close up the paper and press the folds well together again, so as to keep them well marked, and thus enable the paper to keep its corrugated appearance. Following these precautions we can make staircases, window-blinds, boxes, vases, hats, mats, Chinese lanterns, and, in fact, there are few objects that cannot be represented by folded paper twisted or turned in a certain way.

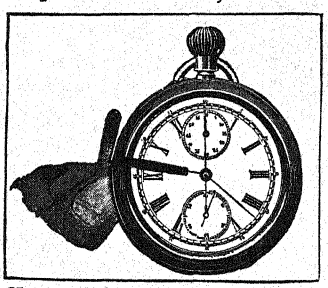
It is certainly wise, in the first place, to get paper for our purpose that is tough and will not easily wear out at the folds. If we get a common paper, the folds soon wear into holes, and we are under the necessity of going to the trouble of folding another sheet. At the same time, it must be borne in mind that a paper must not be selected so tough that it will not fold neatly and closely, or our efforts to make graceful objects will end in failure.

Before attempting to give a display to our friends, it is, of course, essential that we should have a good deal of practice in quickly manœuvring the paper. The effectiveness of such a display depends upon the speed and neatness with which we perform.

HOW TO USE A WATCH AS A COMPASS

IT very often happens that we should like to know in which direction the north or south lies, yet, as very few people carry even the simplest form of mariner's compass with them, we are generally content to make a more or less inaccurate guess at it. But most people carry a watch, and if this shows the correct time, and the sun is shining, it becomes quite a simple matter to find the south, and, from that, any other direction.

This is how it is done. Hold the watch horizontally, face upwards. Then place some slender article, such as a match or the stalk of a flower, upright against the edge of the watch, and at the point on the rim of the glass opposite the point of the hour hand. By turning about, it is easy to get the watch into such a position that the shadow of the match falls along the hour hand, as seen in the picture. This means that the hour hand is pointing at that spot in the horizon which comes immediately under the sun. The south is exactly midway between that point and the figure XII on the dial. Thus, if it is eight o'clock in the morning when we try the experiment, we know that, when we have got the watch in the position necessary for the shadow of an upright match to fall along the hour hand from its point, a line drawn from the middle of the dial through the figure X will point to the south. If it is ten o'clock when we make the experiment, then the south will be indicated by a line drawn from the centre of the dial through the figure XI. If it is afternoon the same rule applies, only in that case the point to indicate the south will be backwards in time, not forwards. If it is two o'clock the line to indicate south will pass through the I, and if it is four o'clock the line will pass through the II.



How we may find the points of the compass by using an ordinary watch.

To understand this, we must remember, first, that the sun is exactly in the south every day at noon, so that it takes 24 hours to complete its apparent journey round the earth; second, that the hour hand of a watch takes 12 hours to go completely round the dial, and therefore moves twice as fast as the sun. Now, if at noon we place the watch in the position described, with the hour hand pointing to the sun, evidently the figure XII will be pointing south. Therefore, at any other time, say, four o'clock in the afternoon, we know that the hour hand of the watch has gone twice as far past XII as the sun has gone past the south; so that, as we still have the hour hand pointing at the sun, we must go half-way back to XII to get the south, which of course means that the figure II points south. In the same way, if the time was eight o'clock in the morning, the hour hand will go twice as far before noon as the sun goes before it reaches south, and therefore half-way *forwards* to XII—that is, the figure X points south.

For the sake of simplicity, we have spoken only of exact hours, four o'clock and eight o'clock, but any other time would be equally easy, since it is the hour hand only which we use, and half-way, in one direction or the other, from the hour hand to XII is the south.

HOW TO MAKE A COLLECTION OF SHELLS

IT would be well to begin with the land-snails. Some are as large as horse-chestnuts, others so small they are like pin-heads. They differ, too, in color and in shape. The surface may be smooth, or furrowed with lines, or rough, with short, stiff hairs. The opening of the shell, out of which the feeding snail thrusts its head, is called the lip, and is sometimes curiously bent and wrinkled; on the inside there often appear little ivory-like knobs called teeth.

WHERE TO FIND WATER SHELLS

The best place to look for shells is the seashore, and on any beach or coast we shall be sure to find something of interest and value for our museum. Some will, of course, be broken, through having been thrown upon the stones by the waves; but many may be found embedded in the tangled seaweed. As there are very many tiny shells, a pocket lens, which will prove of great assistance, should be taken on our shell-hunting expeditions. We may also obtain many interesting specimens of shells from the fishermen on our coasts.

For fresh-water shells, the river, the stream, the pond, and the ditch should be searched, and a warm, sunny day with little wind is the best time. Some kind of a dredge is necessary, and a handy one may be made of perforated zinc in a similar shape to that of a coal-scoop, only smaller. If the water is clear, we may be able to see shells lying in the shallow water; but if we are unable to see, we should use our dredge, drawing it first through the surface water and afterwards through the mud or gravel at the bottom.

HOW TO LOOK FOR LAND SHELLS

If we cannot get to the seaside, or even reach a river or stream, we can find land shells, even in our gardens; and if it be only the shell of the garden snail that is available, it is astonishing what an interesting collection can be made of different varieties. The evening of a rainy day is the best time to search for land shells, and, although they may be found all the year round, the months from April to December are the best. The hedgerow, the mossy bank, among the roots of trees, under stones and logs of wood, under leaves and heaps of rubbish, these are some of the places in which to look for land shells. The creatures that live in the shells come out to feed at dusk, so that the best time to begin our search is in the evening.

TO CLEAN THE SHELLS

If the shell is inhabited, we must first of all remove its occupant, and then the shell should be soaked in hot water. This will dissolve any salt that may adhere to sea-shells, and will loosen the dust on all shells. Having thus thoroughly cleansed our specimens and dried them, we shall find it a good plan to paint them over with a thin solution of gum arabic, to give them the lustre and glistening appearance that they have in water. Ordinary white of egg may also be used for the purpose.

HOW TO ARRANGE THE SHELLS

If we can get little white cardboard boxes, such as jewelers use for putting rings and chains in, they will be the most suitable for storing our shells. We are fortunate indeed if we can find a few candy boxes, especially those made with two or three layers, for these would be splendid for the purpose. If we feel ambitious to start a larger collection of shells, we may use a shallow wooden packing box divided into compartments. The shells look very nice arranged in their boxes in cotton-wool or wadding, which may be purchased at the store for ten cents. We should use white wool for the dark shells and blue or red wool for light shells. Some collectors stick their shells down on colored cards, but it is better not to *stick* the shells down. A little label should be stuck on each box with the name of the specimen, and the place and date of finding. These labels may be pieces of ordinary stamp-edging. Of course, for sea-shells, such as those of oysters, scallops, and mussels, larger cases are required.

THE SHELLS TO SEARCH FOR

The first of the land shells is that of the snail, there being forty different kinds, and in many cases the shells of each kind vary greatly. Of the ordinary snails, the most easily found are the common snail, with olive shell and dark-brown bands; the girdled snail, with its yellowish-green shell, not to be confounded with the rarer and prettier green snail; the garden snail, which varies greatly in its colors; the shrub snail, resembling the garden snail; the gored snail, found in chalk and lime districts; and the black-tipped snail, that is so much like the gored snail as to be often mistaken for it; the pale-green heath snail, and the greyish bristly snail, which may be found on dry heaths.

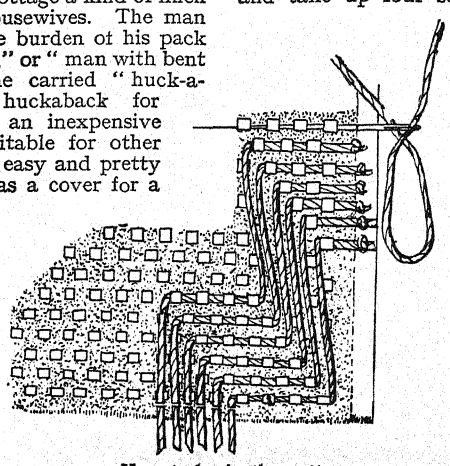
In addition to these common snails, we should look for the transparent glossy snail, that can be found under decaying leaves and in damp moss. The shell is very thin and glossy, and is a transparent green. Then there is the smooth yellowish shell of the cellar snail, found in cellars and drains and among the long grass of fields; the flat, yellow, and polished shell of the garlic snail, so called from the odor of garlic which it has when alive; the dull snail, with the small yellowish-brown-colored shell; the delicate snail, another kind with a tiny shell, smooth and very glossy; the amber-colored shell of the rayed snail, small and wrinkled; the little excavated snail generally found under fallen trees; the small shining snail which does so much damage in hothouses.

Other shells we shall find in large numbers on land, and in the ponds and rivers and ditches, and it is an interesting occupation to identify these by grouping them after the style of the specimens in the local museum, or, if there is not one near, by searching through the pictures in shell books that can without doubt be obtained from the local library. Sea-shells gathered on the holidays may also be identified and grouped in the same way.

A HUCKABACK TABLE COVER

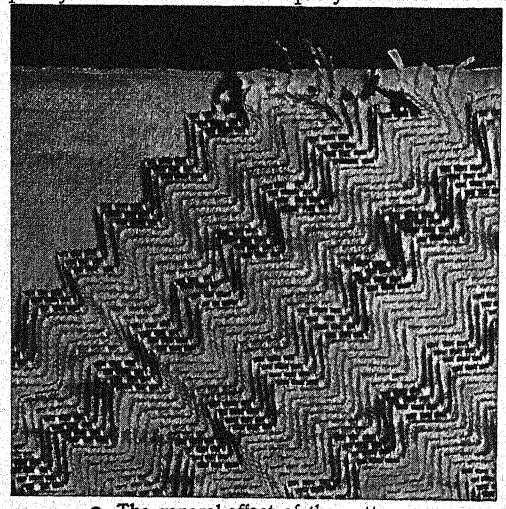
HUCKABACK! This sounds like a very peculiar word; yet it deserves respect because of its great age, and because it has history wrapped up in it. Centuries ago, long before there were stores within easy reach, hawkers, or "hucksters," used to tramp through England, Germany, and the Netherlands, to sell in castle or cottage a kind of linen cloth much prized by housewives. The man with back bent under the burden of his pack they called "the huckster," or "man with bent back," and the linen he carried "huck-a-back." We still use huckaback for toweling, but it is now an inexpensive and durable material suitable for other purposes. Worked in an easy and pretty fancy stitch, it is useful as a cover for a table or stand and is also attractive as a pillow-cover.

If we ask for it at the store, we shall find there are several kinds, one white and rather thin, measuring twenty-three inches in width and costing about fourteen cents a yard, and a thicker, rather cream-colored material, also twenty-three inches wide and costing about eighteen or twenty cents a yard. Both have a little white square spot. It is this little white spot which makes it possible to use huckaback as a foundation for fancy-work, as we shall see.



1. How to begin the pattern.

Suppose we have a table for which we should like to make a pretty washable cover. We measure it to see what quantity of huckaback we shall need, allowing for a hem round the edge. That shown in picture 2 is a rather coarse cream-colored variety. At the same time we buy some balls of silkoline, five at about eight cents each, shading from light to dark either in blue, pink, yellow, or green, as fancy may dictate, to suit the general coloring of the room.



2. The general effect of the pattern.

If we look at picture 2, we shall see that there are two rows for each of the five shades—ten rows altogether to form a a series. We might use fewer colors; then the pattern would be smaller; or still more, when we should get the effect of wider bands.

The method of obtaining the up-and-down pattern is very simple. We thread a wool needle—choosing this for its large eye and blunt point—with a needleful of the darkest color, and make a knot at the end of the thread. We start with this through the selvedge at the ninth row of white squares up from the bottom right corner of the cloth, and take one stitch to the left, as shown in picture 1. Then, omitting the three squares below, we pass the needle under the fourth and take up four squares on the needle, as though we were darning. If we have forgotten how to darn, we should look at page 3555. The thread is then stitched through and cut off about one inch from the end. Keeping the same colored thread, we start the next row with the square in the second row from the selvedge, and proceed to follow the course of the first thread along the squares beside it. If we remember always when we have once passed the irregularity of the first corner that we take up four squares on the needle, then miss the three squares below and start with the fourth, we shall find the pretty wavy pattern shown in picture 2 growing under our fingers. This illustrates the general effect of the work on a small portion of the cloth, not at a corner. Thus we see the work is simplicity itself, and can be done very rapidly. When all the surface of the huckaback is covered with the thread, the edges with the loose ends are neatly turned over and hemmed in on the wrong side. A fringe or lace edging of the same color as one of the balls of silkoline makes a dainty finish to the table-cover; or, as silkoline is much used for crocheting, we may like to crochet an edging with it. A pattern with a pretty point would be most suitable. If we have learned how to make gimp with a hairpin fork, as described on page 4496, we may like to use that for an edging.

It is possible by working very short rows, say, two or three waves wide only, that is, with less colors, to make a border and leave the greater part of the huckaback uncovered. Again, with a little ingenuity, we can easily contrive many kinds of patterns—squares, diamonds, stars—and even outline figures

and landscapes. But if anything of this kind is attempted, the huckaback should have a very clear and prominent pattern, otherwise the counting of the squares will prove most tedious work and will be very trying to the eyes. In fact, all work of this kind should be done on coarse material.

There are other uses for huckaback worked in the way here described. It can suitably be made up into handkerchief-sachets, shoe-bags, nightdress-cases, comb-bags, sideboard-cloths, and covers for tables, and one of the greatest advantages for all articles in daily use is that huckaback washes perfectly and wears very well, and in addition to this is quite inexpensive.

THE ANSWERS TO THE PUZZLE PICTURE-NAMES

ON page 4810 is a series of puzzle picture-names of famous people of whom we read in the BOOK OF MEN AND WOMEN. The following are the correct names and the pages on which we can read something about them: (1) Tarquin, page 435; (2) Drake, page 862; (3) Selkirk, page 364; (4) Baker, page 302; (5) Agrippina, page 538; (6) Emmanuel, page 65; (7) Dampier, page 364; (8) Blaxland, page 364; (9) Columbus, page 62; (10) Romulus, page 435; (11) Antony, page 535; (12) Shakespeare, page 5579.

SOME EXERCISES TO PRACTISE AT HOME

PERHAPS some of us are quite tired of hearing the words "Don't stoop," and most likely when we do hear them we only straighten up for a few minutes, and then the head sinks, the shoulders come forward, and the back rounds as badly as ever again. It may be necessary, if we are really too fatigued to hold ourselves up, to lie down flat for a short time in order to rest our muscles; but it is our regular daily exercises that will be most helpful toward strengthening the muscles and curing the stooping, *if we make up our minds that they shall.*

So let us set to work again, and take our exercises before a mirror if we can, to make sure that we are carrying out the directions given, and are correctly copying the pictures that illustrate them.

I. BREATHING

Handkerchief drill. Attention. (1) Place first finger of left hand on left nostril, so as to close it; (2) breathe in deeply through right nostril; (3) release left nostril and close the right with right forefinger, and breathe out slowly through left nostril; (4) do the exercise again, this time breathing in through the left nostril, and out through the right. Repeat three or four times alternately.

II. ARM EXERCISES

Attention. (1) Arms upward bend; (2) arms forward stretch, the arms and hands the width of the shoulders apart, palms facing, fingers and thumbs straight, arms straight and level with the shoulders, body upright; (3) return to arms upward bend, always keeping the shoulders back; (4) repeat several times, being careful to stretch out as far as possible, and to return smartly to perfectly correct position; (5) from arms upward bend, proceed to arms stretching downward, with vigour, palms turned to sides, fingers straight, shoulders well back; (6) return, with a will, to arms upward bend; (7) add these two exercises to those already learnt, and proceed thus—from arms upward bend, arms forward stretch, return; upward stretch, return; sideways stretch, return; downward stretch, return. Repeat this exercise several times, and see that you stretch well and return smartly. The exercise can be slightly varied by doing each movement three or four times before passing on to the next.

III. FEET EXERCISES

Attention. Feet full open, hips firm. (1) Feet placing outward; place the left foot about two foot-lengths in the direction in which the toe points when standing at full open, bending the knee of left leg slightly, and keeping the right straight, dividing the weight of the body equally between the two legs; let the toe touch the ground first; head well up, chin in; (2) return to full open position, taking care not to drag the returning foot; (3) repeat movement, this time with right foot; (4) add this exercise to those already learnt, thus—feet placing sideways, return; forward, return; outward, return; repeating several times.

IV. TRUNK EXERCISES

Be particularly careful to breathe gently and quite naturally all the time that you are doing these exercises; never hold the breath. Trunk bending backward, feet astride, hips firm. (1) Raise the chest and bend the upper part of the spine slightly backward, the head being carried back with the body; keep the knees straight, and do not bend the body from the waist; (2) return to first position by trunk upward stretch; (3) repeat several times, bending a little farther back as the exercise becomes easier, but always from the top part of the spine; (4) add this exercise to those already learnt, and proceed thus—trunk bending backward, return; forward, return; trunk turning left, return; right, return. Repeat several times.

V. BREATHING

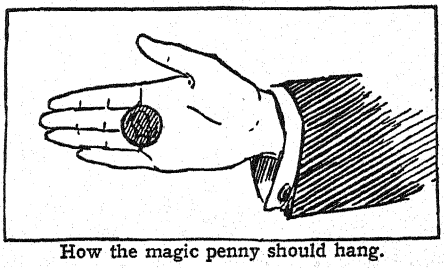
(1) Start with the arms by the side, palms inward; (2) breathe in, as the arms are turned backward, pressing the shoulders back till the palms are outward; (3) breathe out as the arms are turned back again to the first position.

THE MYSTERIOUS DISAPPEARING PENNY

THIS is a penny through which a tiny hole, not larger than the thickness of a pin, has been bored, close to the edge.

Having obtained a penny so treated, the young conjurer must next procure a long hair. A piece of fine pink or flesh-colored silk thread will answer the same purpose, and, in fact, is in some respects more manageable. A few inches of the hair, or silk, as the case may be, are to be passed through the hole in the coin, and the ends tied together so as to form a loop. This loop must be of such a size that, when it is passed over the fore-finger as far as it will go, the coin shall hang down over the lowest joint of the middle finger as shown in the picture.

The coin being thus made ready for use, the young wizard must practise making it disappear and reappear; or, in other words, transferring it to the back of the hand, where it will naturally be invisible, and bringing it again to the front. The disappearance may be effected in either of two ways. The first is by means of a quick backward turn of the wrist, the coin swinging over to the rear by its own weight. The second is to tip it back with the tip of the thumb. Both methods should be well practised, and it will be found a good plan to practise them before a looking-glass, as we can then judge of the exact effect produced. The tilting movement should, in either case, be covered by a slight sweep of the arm backwards, to cover the disappearance of the coin, forwards for its reappearance.



How the magic penny should hang.

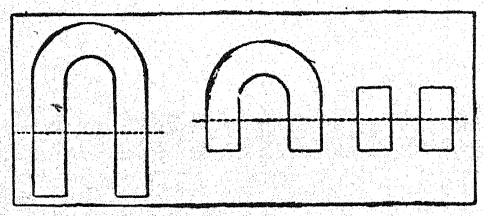
The effect will be magical, if professedly executed with a coin just borrowed, as to which there can be no idea of preparation. But a clever conjurer is not content with merely causing the disappearance of anything. To make the trick complete, he makes the vanished object appear somewhere else. As a simple example of this, we will suppose that, having the prepared coin, suspended by its loop, concealed in the right hand, the performer borrows a penny, which he takes in the left hand, letting it lie on the joints of the second and third fingers. Making a half-turn of the body from left to right, he apparently places it in the right hand, in reality retaining it in the left by slightly bending the two fingers above named, and showing in the right hand the trick coin, as if that were the one just lent to him. The other hand is drawn away, palm downwards, as if empty.

Showing the trick coin as above, lying flat on the hand, the performer asks someone to spread a handkerchief over it. "Go!" he says. He lifts the handkerchief delicately by the centre, but the coin has disappeared, having been tipped over by the thumb to the back. Again he has the palm covered and brings the coin, by tilting the hand as he removes the handkerchief, mysteriously back again. At this point there will probably be a cry of "Up his sleeve," the sleeve having from time immemorial had the credit of half a conjurer's uncanny deeds. To disprove the false accusation, he pulls up the sleeve, and with the arm bare "vanishes" the coin once more, but at the moment of saying "Go!" thrusts forward the closed fist of the left hand, and opens it with a jerk, showing the borrowed coin therein.

He may now pick up the borrowed coin from the left hand, again showing instead in the right the trick coin, which he has meanwhile swung once more to the front. He then says: "I shall now order the penny to pass into that matchbox," where he has concealed a similar coin beforehand. The right hand is again shown empty, and while the astonished company turn to see whether the coin has really passed to the place indicated, the real borrowed penny is quietly dropped into one of the pockets of the conjurer.

SOLUTION OF THE CARD PROBLEM ON PAGE 4707

THE boys and girls had been greatly puzzled for a long time by the problem that their uncle had set them, but when he showed how the horse-shoe card could be divided into no fewer than seven pieces by making only two cuts, it seemed very simple indeed. The card was not to be folded in any way. Holding the card at the bend in one hand, the uncle took the scissors in the other and made one cut across the two arms of the card. This, of course, divided the card into three pieces. Then putting the two straight pieces which he had cut off by the side of the piece of the card that was left, and that was still a horse-shoe shape, he made one cut right across, cutting through the two pieces already detached, and also through the two shortened arms of the horse-shoe. This divided the card into seven pieces, as was desired, and the problem was therefore solved in the manner shown in the above picture.



How the two cuts are made in the horse-shoe card.

THE NEXT THINGS TO MAKE AND THINGS TO DO BEGIN ON PAGE 4921.



A Beaver at Work on His Dam.

CANADA AND THE FUR TRADE

CONTINUED FROM 4624

A FEW years ago, Quebec celebrated the three hundredth anniversary of the beginning of the fur trade in the western hemisphere. Trading in furs was the leading enterprise of the Dutch during the short period of their supremacy. It was the chief occupation of the English during the first century of their rule over the thirteen colonies and was the chief interest of the French in the days of their supremacy in Canada. In extending the fur trade, Alexander Mackenzie discovered the Mackenzie River and made his way across the Rocky Mountains to the Pacific Coast. David Thompson discovered the Thompson River, and Simon Fraser followed the course of the Fraser River to the sea. People now realize that the trapper, the hunter, and the fur trader have performed invaluable services in exploring and civilizing America.

THE FRENCH, THE FIRST FUR TRADERS

The French commenced the trade. Shortly after Columbus discovered America, Frenchmen were fishing for cod off the Banks of Newfoundland. These fishermen discovered the natives on the neighboring shores had valuable furs for which they were ready to take mere trinkets. Soon many gave up their fishing to devote their entire time to the more lucrative fur trade.

During the French rule in Canada the fur trade was considered by far the most important occupation of the people. The great profits in furs were the chief incentives to further exploration and colonization. In a few years, fur animals in the vicinity of settlements became scarce. Traders and trappers found it necessary to travel further and further inland. As early as the seventeenth century they traveled for months into unsettled wastes, trapping, hunting and trading with the Indians.

THE STORY OF THE "COUREURS DES BOIS"

The rule of the priests was almost as strict as that of the Puritans in Boston or the Quakers in Philadelphia. The church made strict laws against drinking and it was only allowed in Montreal at the annual fur fair, when all the townsfolk with their savage guests had been in the habit of becoming intoxicated from the first beginning of the fur trade. Neither the trappers, when they came home to squander their money in holiday making, nor the loafers of the cities, liked these restrictions. Many offenders in order to escape punishment sought the free and reckless life of the woods. It was then, for the first time, that the French trappers, hunters and canoemen got the name of *coureurs des bois*

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(wood-runners), which they retained ever after when in the service of the different fur trading companies. Rarely did they return to their native land. The wild roving life in the wilderness was too exciting to permit a voluntary return to the narrow limits of civilization. The wood-runner as a rule took to himself an Indian wife and got along pretty well with his squaw. In addition to hunting and trapping the wood-runners became canoe-men and freighters to the trading companies. To the half-breed children of these French and Indian parents descended the vocation of their fathers and the roving instincts of their mothers. To this class may be added a considerable number of "metis," the offspring of Scotch and English fathers and Indian mothers. Scattered over the vast western country, the half-breed has formed the advance-guard of civilization.

THE ORIGIN OF THE HUDSON'S BAY COMPANY

While the French were developing their fur trade, a strong rival appeared in the north, establishing its trading posts in the vast wilderness surrounding Hudson Bay. In 1670, King Charles II granted to a company the exclusive privilege of trading, and the full power of governing the district drained by the rivers which flow into Hudson Bay. This great district was called Rupert's Land because Prince Rupert, the king's cousin, was the first governor of the company. The corporation, the pioneer in its field, and the one which to-day is the largest fur trading enterprise in the world, is the Hudson's Bay Company.

The company built many trading posts on the shores of Hudson Bay and from these forts carried on their trade with the Indians. In June vessels left England with merchandise and in September started homeward, laden with furs collected from the various trading posts. Guns and ammunition usually formed a large part of the cargoes sent to America. The company, being a trading corporation, did not make any attempt at colonization. It aimed to preserve the forests as breeding places for animals and to keep settlers out.

INVASION OF RUPERT'S LAND BY THE FRENCH

In order to get furs, the Hudson's Bay Company sent its traders to the Indian tribes inhabiting the vast wilderness to the south. They succeeded in turning a great amount of Indian trade from the French to the northern posts. This aroused the anger of the French, so that in June, 1686, they fitted out an expedition and sent it northward to drive their rival from the Hudson Bay district. The French captured all the leading trading posts, and seized many valuable furs. During the European wars of the next few years, of which we read in the story of Germany, the posts changed hands many times. The end came with the Treaty of Utrecht in 1713, when King Louis of France surrendered all his claims to Hudson Bay and the surrounding territory. After the peace, the company rebuilt many trading posts destroyed during the struggle, and opened new stations in remote places. The trade increased rapidly and by the middle of the eighteenth century was very profitable.

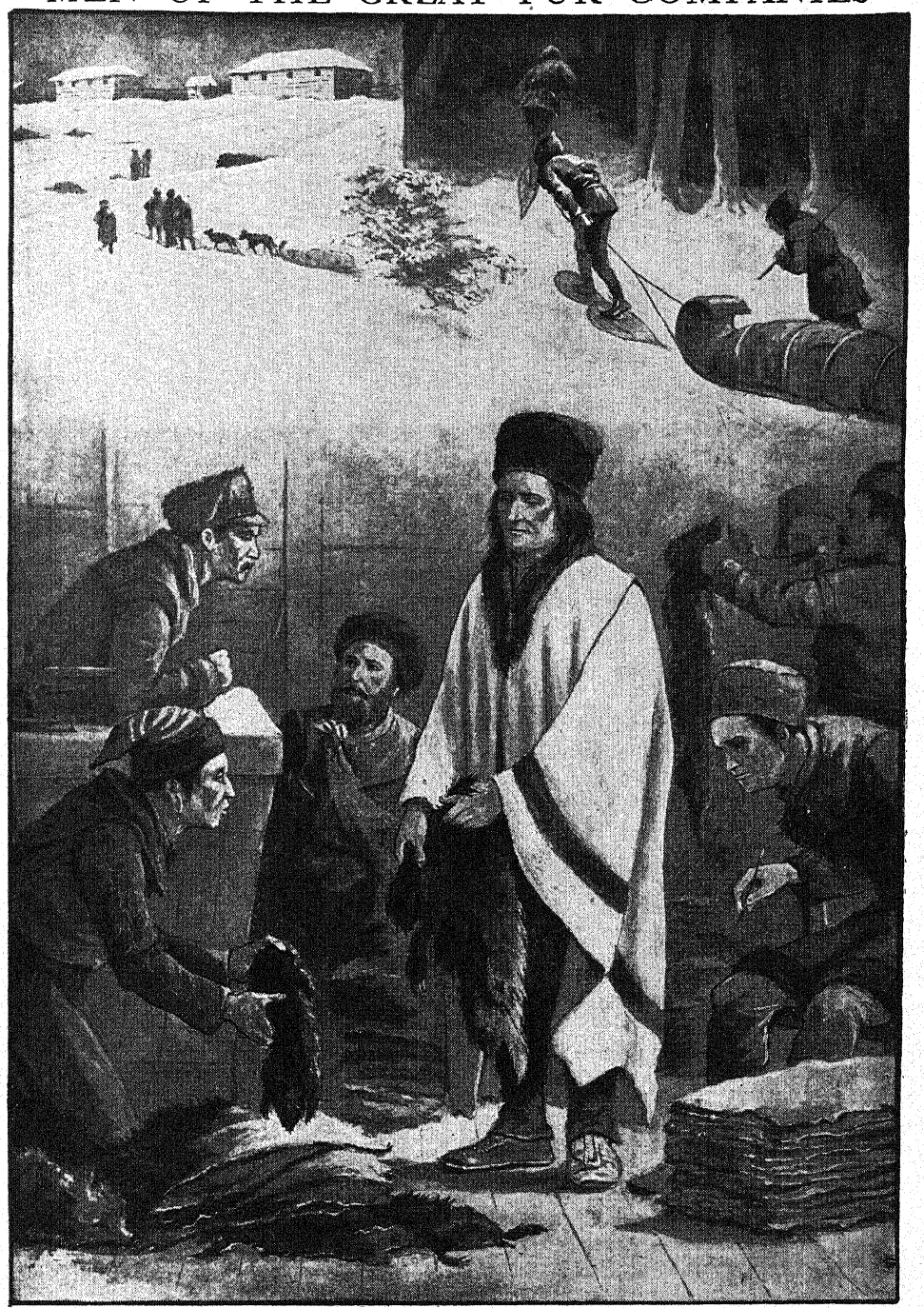
THE NORTHWEST COMPANY AND ITS BEGINNING

The change of flag in Canada brought a great number of Scotch merchants to Montreal and Quebec. It was not long before they learned of the profits of the fur trade and engaged extensively in it. In 1783, the chief traders founded the famous Northwest Company. The new company engaged more than two thousand *coureurs des bois* who had been trapping on their own account since the English conquest. These French Canadians rendered valuable assistance, as they knew every path and stream from Labrador to the Rocky Mountains. Within a few years trading posts of the Northwest Company could be seen down the St. Lawrence, up the Ottawa and the Great Lakes, across the prairies to the Rockies and northward by the Athabasca and Mackenzie Rivers to the Arctic circle. Their headquarters were at Montreal while the chief trading post was first at Grand Portage, and afterwards at Fort William on the northern shore of Lake Superior. Each year, a solemn meeting was held where the wealthy members of the corporation made a demonstration to terrorize their savage allies and dependents.

THE CLASH BETWEEN THE TWO GREAT FUR COMPANIES

It was inevitable that the competing companies should clash sooner or later. They were divided by blood and religion

MEN OF THE GREAT FUR COMPANIES



The fur trade has played an important part in the explorations of Canada. The demand for handsome furs led intrepid men to risk their lives for the sake of rare and beautiful skins. The hunter and trapper have always been the pioneers in Canada, and the farmers and townsmen have followed in the way they have marked out. This old picture shows us the scene, in a trading post of one of the great fur companies, when Indian trappers brought their furs to trade them for goods. Above it, in the corner, is a picture of Fort Chipewyan, the historic fort from which Alexander Mackenzie set out on his long journeys, first up the Mackenzie River, and afterward to the Pacific Coast. The greater part of the fur trade of Northern Canada is still in the hands of the Hudson's Bay Company, and although the dress of the trappers may differ, scenes similar to this may be seen at the trading posts of the company when the furs are brought in.

as well as by trade jealousy. The employees of the Hudson's Bay Company were Scotch almost to a man, while those of the rival were chiefly French Canadians or half-breeds and ardent Roman Catholics. When they came together, they were always ready to fight, employing all the cruelties of Indian warfare. The companies first came to blows on the Saskatchewan. The Northwest traders were in possession of the Saskatchewan valley, claiming they were the legitimate successors to the old French explorers. The Hudson's Bay Company also laid claim to the rich fur region. Neither would give way, so open warfare broke out. Forts were destroyed and fur stores fired. Ruffians and murderers in the employ of both companies wreaked vengeance on the enemy. Men were murdered; women and children were tortured with all the cruelties known to the Indians. If forgotten graves could give up their secrets they could tell many a tale of massacre, of violence and of treachery between Fort Garry (now Winnipeg) and the Rockies. Neither company cared to keep records of this brutal warfare where massacre, murder, and torture were committed by paid assassins. Finally Sir George Simpson, a young Scotchman, was appointed head of the older company. He brought peace and union, in which the Northwest Company lost its separate name and organization, and the Hudson's Bay Company once more had the monopoly of the great fur country. This was in 1821.

THE SALE OF RUPERT'S LAND TO CANADA

The growing national sentiment took shape in 1867 when, as we read elsewhere, four provinces were united into the Dominion of Canada. A desire soon arose to expand westward and northward. At last, the company was induced to surrender all its rights to Rupert's Land. The Canadian government paid the company one million five hundred thousand dollars and allowed it to hold all its posts, ten acres of ground around each of them, and to retain a twentieth of all the land within the fertile belt between the Red River and the Rocky Mountains.

British Columbia, where the Northwest Company had established many forts, already had a government of its own, and shortly afterward became part of the Dominion.

The transfer of Rupert's Land was made to the Dominion in 1870, just two centuries after Charles had granted the charter to the company. The Hudson's Bay Company lost the political power which it had wielded for two hundred years over a large part of North America. It still gains a large revenue from the trade in furs, and it shares with the Dominion government in the profits which the sales of land bring through the extension of the area of cultivation. During 1910 the profits from land sales amounted to over a million dollars.

The fur trade was thrown open to all, but for many years few competitors entered the field. About 1890, however, independent traders were attracted to the fur regions. In 1901 Revillon Frères, a wealthy French company, opened many trading posts in the far north and now secures a large share of the best furs. A few small companies have entered into the trade. The old company still remains the greatest fur company in the world. It exports about two-thirds of the furs sent from the north and one-half of those sent from the whole Dominion.

THE BEAVER SKIN, THE MONEY OF THE FUR COUNTRY

A peculiarity of the fur trade is that money values for ages were unknown and are to-day in many of the trading posts. Everything is measured in terms of skins. The skin is a very old term and is based upon the standard of the beaver skin or, as it is called, "made-beaver." A "made-beaver" is the skin of a full-grown perfect beaver, killed in season, properly cured and weighing from sixteen to twenty ounces. It is the uncoined money of the north. The skin does not pass in transactions, but is the unit of value or standard, in terms of which furs or goods are measured. Traders have small sticks to represent it, and these pass as money at the stores.

HUNTERS AND TRAPPERS IN THE WOODS

The expert hunters and trappers of fine furs are the wood Indians, and from them are traded the greater part of the furs that come from the north. Generally peaceful, they pride themselves upon an honesty unknown to the lawless tribes of the plains. While a trader was visiting a neighboring post an Indian came to exchange his furs for goods. Finding the door locked, he broke in, took what goods

he needed and left what he considered a fair value in furs. Six months later the Indian came back to see if he had left enough furs for his goods.

By the beginning of November, the animals have their winter coats and fur is in season or prime as it is called. The trapper, who has taken his residence in some favorite locality, now prepares to lay out his trapping walk. He leads a solitary and dangerous life. To be alone in the trackless forest demands a courage and endurance of no ordinary kind. Silently he trudges along; for the trapper must not frighten away the animals by whistling or singing. The cold is below zero but the fur will be the finer. Fatigue and cold often exhaust him. A snow storm may overtake him; the bearings and landmarks are lost and forgotten and he who has promised a speedy return may perhaps be seen no more.

As the trapper enters the forest, his keen eyes scan every mark upon the snow for the tracks he seeks. He reads signs left behind by a passing animal as readily and truly as if he had been present and witnessed the whole scene. It matters little whether they are fresh or half blotted out; he never makes a mistake in his reading of the language of tracks. When he observes the footprints of mink or marten he unstraps his pack and starts to set his traps or to make his deadfalls. These he scatters over a long line of country, it may be ten or fifteen miles in length. Once a week, he starts forth to visit his line, gathering the furs caught, repairing the broken traps or deadfalls and setting them again.

"THE EVIL ONE," THE ENEMY OF THE TRAPPER

The greatest enemy of the fur hunter is the wolverine, or North American glutton. He follows the trapper's footsteps and destroys the animals as they are caught. This curious animal has a long body mounted on short legs of great strength. His large and powerful feet are armed with sharp, curved claws. There is not living a more cunning and crafty animal. During winter months he lives by stealing from the traps of the hunters. He hunts day and night for the trail of man and when it is found follows it unerringly until he arrives at a trap or deadfall. He will destroy the animals caught and also the traps. When once a wolverine has established himself on a trapping walk, the hunter's only chance of success is to change ground. Such serious injury does the wolverine inflict that he has received from the Indians the name of " Evil One."

THE GATHERING TOGETHER OF FURS FOR MARKET

At the end of March or the beginning of April the trappers leave their hunting grounds and make a journey to the trading post with the result of their winter's toil. In their march through the forest they present a motley throng, not men only, but women, children and dogs. The braves march in front, too proud and too lazy to carry anything but their guns, and after them the squaws, either carrying loads or driving dogs attached to sleds laden with meat, furs, household goods and infants. Day by day, they plod along until the post is reached. Sometimes they are met by independent traders or rival companies and are induced to sell their furs. Traders frequently visit the hunting grounds, carrying with them goods, and exchange these for furs. There are many Indians who never visit trading posts but do all their trading with the traveling traders. This, however, is rather the exception than the rule. If our trapper does not dispose of his furs, he will in due time reach the trading post. The trader values each pelt, adds the amount together and informs the Indian that he has fifty or sixty skins. The Indian pays for the goods advanced the past season and then picks out the articles that he needs until he exhausts his supply of small sticks, each of which represents a beaver skin. Some years ago, a trapper with his household arrived at Edmonton. He had a couple of silver fox skins among his furs and so his pack brought a handsome sum. After supplying his wants, he traded what he had left for a baby grand piano. It was placed in front of his tent and his children were allowed the free use of it. When the time came for his return, he took a hatchet and smashed the piano into pieces, declaring that he wanted to know where the noise came from. Having spent his money and with only provisions for the season, he and his family turned towards the forests for another winter in the wilderness without the comforts his foolish purchase had cost them.

TRADING WITH TREACHEROUS INDIANS

Sometimes traders have had to deal with treacherous Indians like the Blackfeet. A Blackfoot, if he thought a trader was deceiving him, might not hesitate to shoot him. Every precaution was taken to protect the trader. There is in the old forts a large room called the waiting room with a connecting hallway into the trading room. The hallway has a door, and when it slid back, two Indians with their furs were allowed to enter, and the door closed. The braves were admitted into a room divided into two parts. The partition is very strong and stoutly built. It contains a square opening with protecting iron bars. The Indians bartered their furs, a door opened and they departed before others were admitted. The trader had always to be on the lookout because he could not tell at what moment the Indian might be dissatisfied with the exchange and might show his displeasure by deliberately shooting at him. In earlier days, the Indians after they got back to the waiting room often thought they had been cheated and at once commenced to fill the ceiling with bullets or slash the walls with their hatchets and knives. These days are over but there was a time when trading with the Indians was very exciting and dangerous..

THE PAY OF THE TRAPPER FOR HIS WINTER'S WORK

A good year's catch per man is about five hundred dollars, but the average is nearer two hundred. The Indian remains at the post until all is spent and then borrows on his catch for the following season. The Indian has a peculiar code of ethics. If he deliberately set his traps and no fur animals come, he considers his debt cancelled and is therefore ready to open a new account. It is impossible for the storekeeper to collect the old debt.

EDMONTON, THE GREAT FUR MARKET OF CANADA

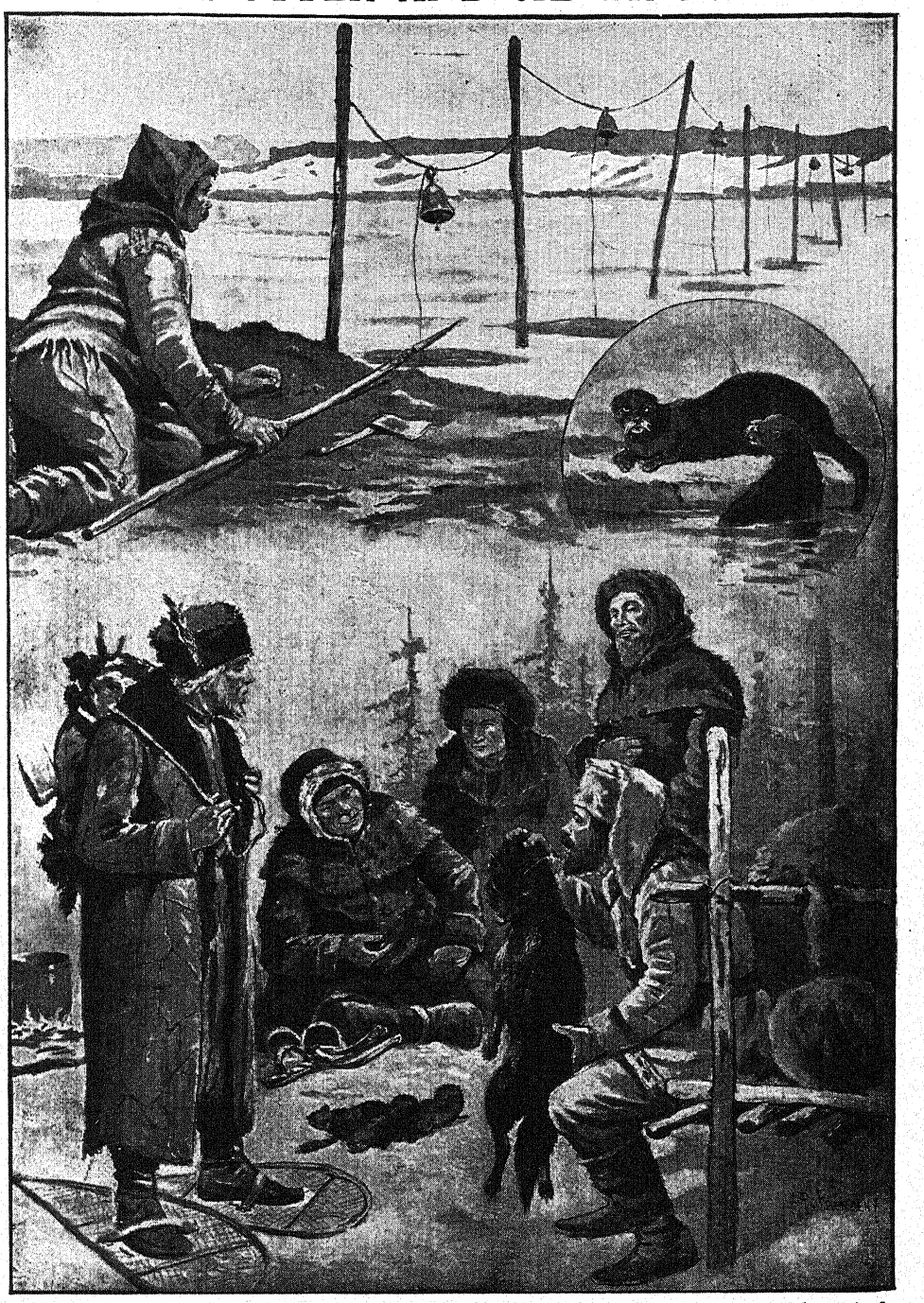
Edmonton, in the province of Alberta, is the greatest market for raw furs in Canada. More than a million dollars in value are shipped yearly from this city. It is the great trading centre for the Hudson's Bay Company. Many independent companies as well as individual traders have their headquarters at this place. Winnipeg and Montreal are also important centres of the fur trade. The greater part of the furs are sent to London, England, where they are sold at public auction.

THE ORGANIZATION OF THE HUDSON'S BAY COMPANY

There are about three hundred and fifty fur-trading posts in Canada, and of these, two hundred and fifty are owned by the Hudson's Bay Company. The company is a wheel within a wheel, consisting of the company proper, which furnishes the capital stock, and the partnership of the Fur Trade, which is employed to carry out the workings of the business. Under the charter, the supreme control of its affairs is vested in a board consisting of a governor, deputy governor and committee of five directors, all annually chosen by the stockholders at a meeting held each November at the company's house in London. These officials delegate their authority to an officer resident in Canada called the Governor-in-chief of Rupert's Land, who acts as their representative. His commission extends over all their Canadian possessions and his office-holding is unlimited as regards time. The authority of the Governor-in-chief is supreme except during the session of his council, which is held once a year and continues its sittings for two or three days. The Governor is chairman of this council, at which he represents the interests of the Board of Directors in England. The council is composed of the highest rank of officers in the service, called chief factors, whose duty and right is to sit at its meetings whenever their attendance is practicable. Members of the second rank of commissioned officers, called chief traders, when they can arrange to be present are also requested to sit in the council. The chief factors and chief traders together constitute the partnership in what is called the "Fur Trade." Vacancies in its ranks are immediately filled as they occur from the death or retirement of its members, the qualification necessary being a majority of the votes of all the chief factors. The candidates for a factorship are necessarily traders, while those for a vacant tradership are from the ranks of salaried clerks, seldom of less than fourteen years' standing in the service.

The members of the Fur Trade also called "Wintering Partners" furnish none of the capital stock and receive

SEA OTTER AND SILVER FOX



The rarer the animal, the more sought after the skin, and as much as $10,000 is sometimes paid for a single fur garment. Among the most valuable skins are those of the silver fox of Northern Canada, and the sea otter of the Pacific coasts. In the upper part of this old picture we see an Eskimo waiting, spear in hand, for the sea otter to come to the surface. The bells, with the strings connecting them with the shallow sea way, were to give warning of the presence of the otter. The circular picture shows what the sea otter is like. Few of these animals are left, and the hunter usually has to go out to sea, at the risk of his life, to find them. The lower picture shows a fur trader bargaining for the skin of a silver fox. It has been found that these beautiful animals will live in captivity, and of late years efforts to keep them on fur farms have been made, as you may read elsewhere. Some of these farms have been successful in rearing the cubs.

their commissions merely as the reward of long and faithful service. Their pay is a definite number of shares of stock, never exceeding a certain limit. Of these a chief factor possesses two, and a chief trader one, so that their incomes are directly affected by the fluctuations of the trade. At present the income of a chief factor is about five thousand dollars including house and keep for himself and family, while that of a chief trader is half of that amount. The Fur Trade is organized under a grant made in 1834.

Recruits for the Service

Successful applicants for a place in the Hudson's Bay Company's service are from sixteen to eighteen years of age. They must pass a rigid examination in education, moral character and physical build. The company has found its best recruiting grounds in the Highlands of Scotland. Many are born in isolated glens. They change the land but not the climate, and as for the circumstances, they have opened careers for their ambitions. They sign for a term of five years, although the direct understanding is that the applicant shall devote his life to the trade. This happens in nearly every instance, as the mode of life unfits him for active duty in any other vocation. When an opening occurs the recruit sails for the company's headquarters at York Factory. His salary at first is one hundred dollars a year with his lodging and board.

The Service

On arriving at York Factory, he is generally sent to pass the first five or ten years of his apprenticeship in the extreme northern districts of Mackenzie River and Athabasca. The occupations of his first years are those of salesman behind the counter in the trading-shop and an occasional trip with the half-breed traders attached to the post to the various Indian camps in the vicinity for the barter of goods for peltries. A few years pass and he is promoted to the accountant's office. At the accountant's desk the apprentice, now known as a clerk, remains generally until fourteen years of service have passed, unless placed in charge of a post as chief clerk. During this period, he has been gradually nearing the great trading posts which form the headquarters of a district. His salary has increased from one hundred to five hundred dollars per annum. His habits of life have become fixed and he has no desire for change. His ambition points but one way, to a higher rank in the service that he has chosen.

At the expiration of fourteen years of service, if a vacancy occur, the clerk steps from the ranks of salaried employees into the partnership of the Fur Trade. Upon the assumption of this dignity he is appointed to the command of some important post. Here his duties are a general oversight of the business immediately connected with the establishment and vicinity. In a short time death or retirement opens the way for entrance into the ranks of chief factors, the highest class of officials known to the service. In the exercise of the duties of this office he assumes control of a district in many cases as large as a European kingdom, with headquarters at the largest post within its limits and a general supervision over all the other posts. He directs the course of trade, erects new establishments, orders the necessary outfits for the year, and in his capacity as chief magistrate of his principality, with a commission from the government of the Dominion, he rules supreme.

Before 1870, the commissioned officers exercised almost supreme power within their districts. Removed beyond the reach of law, they were a law unto themselves. Their government, though arbitrary, was excellent as far as the Indians were concerned. Any criminal was relentlessly sought out and hunted down. Consequently outrages came to be almost unknown and the posts could have been left unprotected. They were fair and just but severe in their punishment, and gave the country an excellent government. In the two centuries of their sovereignty, not a single Indian rising stained with bloodshed the land over which they ruled.

The fur traders of Canada have had an important place in the history of the Dominion. In his quest for furs, the trader explored the country. The great companies held it with their forts until the nation began to grow, and the time came that the waste places were needed to be filled up with the habitations of man. Then they stepped aside, and a settled government took their place.

THE NEXT STORY OF CANADA IS ON PAGE 5221.

TRADING POSTS IN THE FAR NORTH



Here is a post in the far Northwest with the agent in charge at the door. The tall man in white is a Russian who has drifted across the Pacific to trade in furs. The toboggans are ready to start.

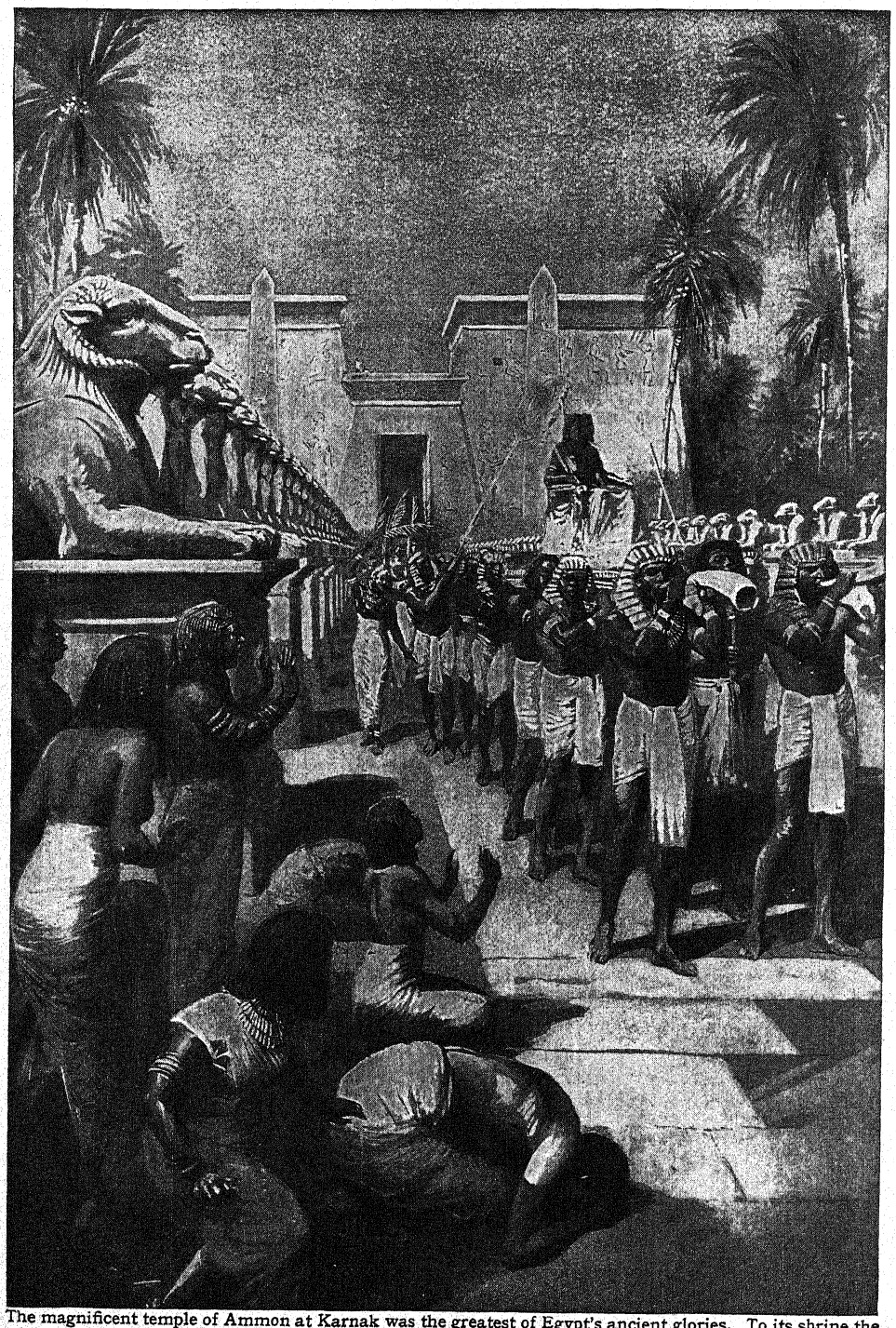


The agent at this post is loading the sled, which is really a toboggan, that is, a flat board without runners. This sled is best for soft snow, and from the snowshoes we know that is what is expected.



At this post on the Buffalo River, the dogs are harnessed and the sledges are about to start. The people you see are half-breed Indians employed by Revillon Freres. The woodpile is in the foreground.
Pictures by courtesy of Revillon Freres, New York.

A PHARAOH ON HIS WAY TO THE TEMPLE



The magnificent temple of Ammon at Karnak was the greatest of Egypt's ancient glories. To its shrine the Pharaohs went with all the state and pomp that it was possible to assume, and as they proceeded up between the impressive avenue of sphinxes, amid the sounds of music, to the portico of the temple, they were regarded with reverence by the onlookers; for, when the Egyptian monarchs went thus to worship, they were supposed to represent in their person the whole of the nation. Ammon was usually represented as a ram.

THE DEAD EMPIRES

ONE of the most famous sayings ever written is the great saying of Paul: "The things which are seen are temporal; but the things which are not seen are eternal." Empires pass away, and nothing remains of them but the unseen things that made them great. Many great empires have existed in the world of which not as much as a shadow remains to-day. Thousands of years ago they rose, and grew, and flourished, and then decayed, because not all their power and wealth could save them when cruelty and selfishness and bad government crept into them. We have already told much of the story of the nations on the earth to-day, and now we tell the story of these fallen empires, and no story in our book brings home to us more deeply the truth that the greatest power in the world lies in things we cannot see—in love, and truth, and hope, and faith, which have never passed out of the world, but without which even empires perish.

EGYPT'S WONDERFUL STORY

CONTINUED FROM 4611


RAMESES II

WE gladly make our way to the country shaped like a lotus lily with a long stalk, lying on the bosom of the hot and sandy mid-world desert. For when we glance—in the story of Africa—at the country as it is to-day, and at its history during the last 2000 years, we are reminded at every turn that a great and wonderful past lies behind those years. We cannot help seeing the stupendous work which that past has left scattered over the face of Egypt, so vast are the buildings and ruins standing on the banks of the Nile and on the edge of the desert.

And so it is that, deeply interesting as we find that ancient land to-day, we cannot help feeling that the true glory and greatness of Egypt lie in long distant times.

We know that the peoples who first invented writing were well advanced in civilization before they began to think of a way of telling their deeds to those who came after them. This was the beginning of history, and the earliest written history of the kings of Egypt that has come down to us was probably inscribed more than six thousand years ago.

It is as difficult to understand the meaning of this vast expanse of time as it is to take in the details of a far-spreading view from a mountain-top. We need a strong glass to help us pick out the villages, fields, woods, and streams, and the signs of life that lie before us hidden in the blue distance. And so to find out the deep interests and beauties of this great view of Time, we must gaze steadily and earnestly into its far haze, using every help that comes to us to strengthen both our sight and our imagination.

The pyramids which we see upon page 4843 will help us; they rouse our curiosity as we look at modern Egypt, and consider the fine crops and wonder at the Suez Canal, and the great dam at Assuan. So let us now without delay mount to the top of the Great Pyramid, as the largest of the three pyramids near Cairo is called.

We shall not find it an easy climb, for it is more than 450 feet high, and the rough blocks of stone, which we have to use as steps, are many feet high. But two strong Arabs in flowing white garments will push and pull us all the way up, chattering broken French and English, till we arrive breathless at the top, where the point is now so much worn down that there is room for several people to stand and admire the wonderful view. There below us is the full, flowing river, which, except in the bad famine seasons

that have come from time to time through the long history, has risen yearly from its bed and fertilized those green and yellow fields with its water and mud. During all those years, perhaps 6,000 and more, the glorious sun, day by day for over 2,000,000 times, has risen from out of the tender-glowing colors of the dawn beyond the eastern desert, has traveled in glory across the busy, fertile Nile valley to its evening setting in a blaze of gold and crimson behind the grim, silent hills of the western desert.

No wonder that the sun, the giver of life, held ever chief place among the gods of the old Egyptians. And each night, after its disappearance, the deep purple sky, ablaze with dazzling stars in the clear air, has ever covered, as with a curtain, multitudes of tired workers, and countless generations of them, not only those whose daily labor was in the fields, or keeping the embankments in order, or raising the water where needed, all through the long centuries, but builders and workmen of all descriptions without number.

THE MIGHTY ARMY OF MEN WHO SET UP EGYPT'S SPLENDID BUILDINGS

Grand and immense buildings, such as those we see by the banks of the Nile, exist only as the result of the movement of material—hard and laborious work indeed—by thousands of human beings.

As we come down the pyramid let us try to realize that the great mass is solid, except for the passages and the funeral chambers to which they lead. Few care to penetrate into the heart of a pyramid. The next time we walk across Madison Square, one of the largest squares in New York, we can shut our eyes and be led along till we reach the middle, and try to imagine what it must be to walk for that distance in a low and slanting dark passage, very hot and close, into a most lonesome, oppressive silence, out of the bright glare of day.

The base of the Great Pyramid is almost exactly the same size and shape as Washington Square in New York. What a scene must have been the building of such a mass, with such a base and such a height, so many centuries ago! We know what a dusty, busy scene it is when a large church or public building is being erected, when bricks and stones are brought up by heavy motors, and every sort of appliance is ready to hand.

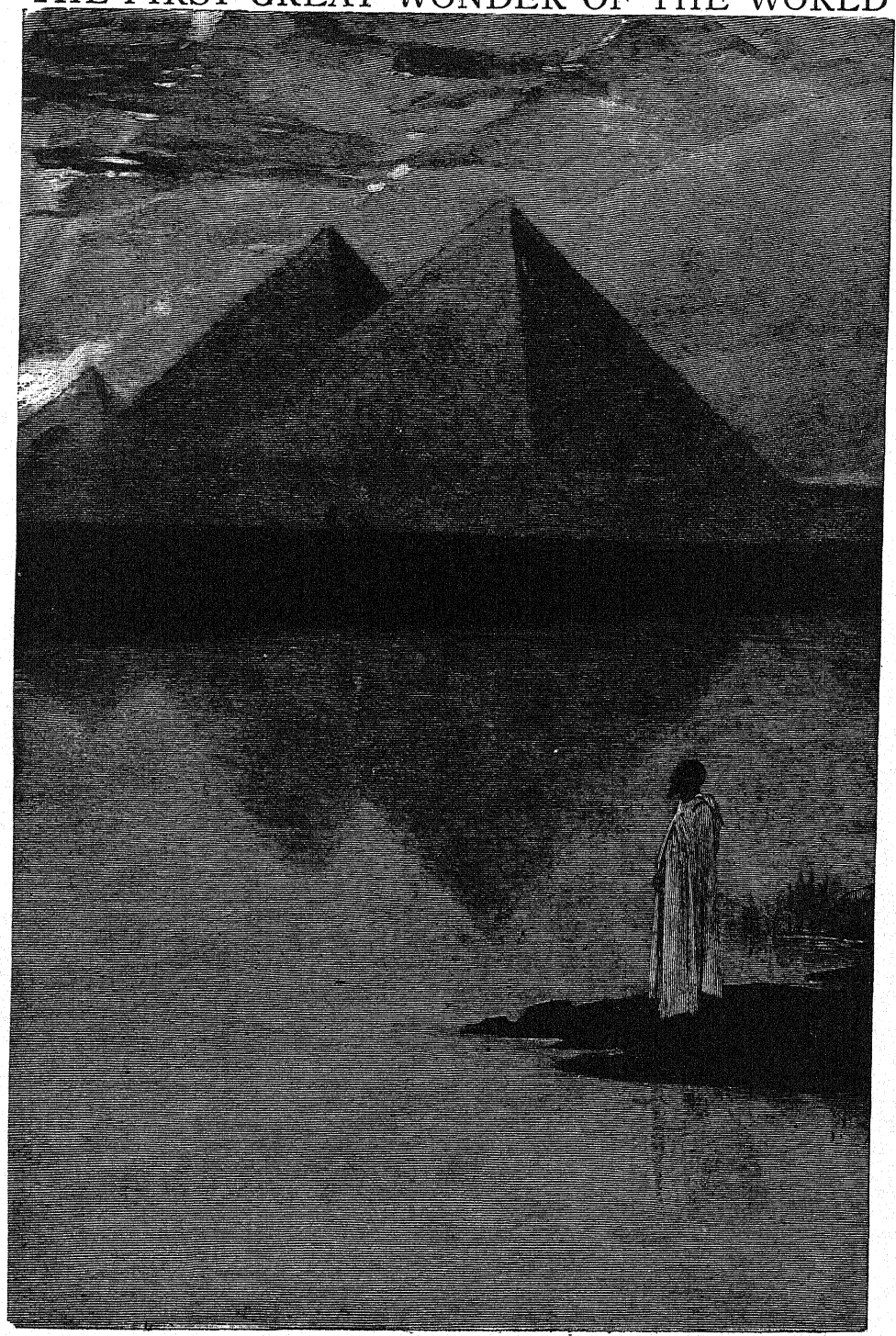
But the huge granite facing-stones of the pyramid had to be quarried near the great dam at Assuan, and brought down the river for several hundreds of miles—almost as far as from Detroit to New York—and then, with enormous toil, men had to drag, push, and roll them over the burning sands.

THE HUNDRED THOUSAND SLAVES WHO BUILT A KING'S TOMB AS HIGH AS A HILL

The rest of the masses of material were equally difficult to obtain. And let us think of the stupendous work of getting it all into place by means of pulleys and rollers and the most exact human skill in masonry ever known. It is said that 100,000 slaves took part in this huge work.

We may well wonder what was the object of building tombs and pyramids at such immense cost and labor. As far as we know, it was solely for the honor and glory of the reigning king, and to provide a secure resting-place for his body after death. Long before the great pyramids were begun, smaller pyramids and temple-like tombs had been erected. Such a tomb was built, perhaps 4,500 years ago, by Prince Perneb, a court official. The walls were covered by paintings and inscriptions by the artists of his time, and when he died he was buried in a rocky burial chamber far down below the tomb. During the ages, the sand of the desert drifted over it; rubbish from the destruction of near-by tombs was cast upon it, and it remained unknown until after the twentieth century had begun. Then it was discovered, taken down stone by stone, and carried across the ocean to the Metropolitan Museum. There it was set up again, and the children of this new world may learn from its painted walls how the people of that ancient world lived and dressed and what they ate in those far-off days. One of the chief points in the religion of the old Egyptians—that wonderful religion which changed so little during its long history—was to arrange, so far as means would allow, for preserving the body, as long as possible, whole and entire. This they did by making mummies of the bodies, by soaking them in a strong kind of soda, and bandaging them very carefully, and then putting them in decorated coffins, which were hidden away in great stone vaults in rock tombs, and in the pyramids, where it was hoped that no

THE FIRST GREAT WONDER OF THE WORLD



Of all the marvelous monuments that remain to-day to tell us of the power and glory of the past, the Pyramids of Gizeh, which we see here, are the most amazing. The largest of these, known as the Great Pyramid, was built by a Pharaoh named Khufu or Kheops for his tomb, nearly 6,000 years ago. It is the largest building in the world, and was originally 476 feet high. The area covered by it is more than 580,000 square feet.

one would ever be able to find or disturb them.

PHARAOHS WHOSE FACES WE MAY SEE IN OUR MUSEUMS TO-DAY

Alas!—for the last 3,000 years at least—from time to time robbers have broken into the tombs, and disturbed what they found; and in our own days we can see, under glass cases in our museums, specimens of the mummies of the great ones of Egypt brought once more into the light of day, after having lain in the dark silence for long centuries.

Perhaps we are wondering why the robbers of old were so anxious to break into the tombs, for they could scarcely care for the mummies themselves. It was the treasure that was buried with the mummies that attracted them; for the Egyptians believed that, in some mysterious way, in the new life to which he had gone, the departed person would need the things he had owned in his earthly life. So with the mummies of royal and rich persons were put their valuable ornaments and their possessions, besides furniture, clothes, and food for the use of the spirit of the departed, and the quaint little figures that were supposed to do the work that would be required in the fields of the land of peace.

WHERE WE CAN SEE TOYS THAT CHILDREN PLAYED WITH IN EGYPT 3,000 YEARS AGO

It is the sight of these personal belongings that brings us into such close touch with the Egypt of 3,000 or 4,000 years ago. There are in the British Museum cases full of such treasures as the dolls with clay beads for hair, and the toys and little worn shoes and sandals of the children; the dressing-cabinet of the fine lady, containing ointments for the eyes; also elbow-cushions and dainty, pink kid slippers. We have, too, the palette and paints of the scribe, the musical instruments of the musician—in short, hundreds of articles of everyday use that bring us face to face with the people to whom they belonged centuries ago.

In the Metropolitan Museum there are models of slaves at their homely tasks about the farm-houses; of granaries such as we read that Joseph built; of boats on the Nile with the men who rowed and sailed them, dressed in the garb they would have worn in their daily lives thousands of years ago.

These were all placed in the tombs, and besides these there were always put beside the mummy representations of the numberless gods to whom the Egyptians prayed, and to whom they erected wonderful temples, whose ruins still form one of the sights of Egypt.

THE STRANGE PICTURES AND SPLENDID TEMPLES OF ANCIENT EGYPT

There is a great group of these temples on the Nile, where the magnificent city of Thebes once stood, far on the way to Assuan. The great halls, imposing gateways, and rows of pillars form a beautiful sight in brilliant sunshine, and deep purple shadow, and, as we gaze at them, we fancy them once more in their first beauty, with long processions of chanting priests and priestesses, and gorgeous display of kingly magnificence when the king came to pay his worship, amidst the stately monuments of gold and silver, adorned with ivory and precious stones. And even yet we have not come to the end of our close touch with the past in Egypt, for we can now read the actual message across the years, written in the ancient Egyptian picture language, which had died out and been completely forgotten after the Roman times in Egypt.

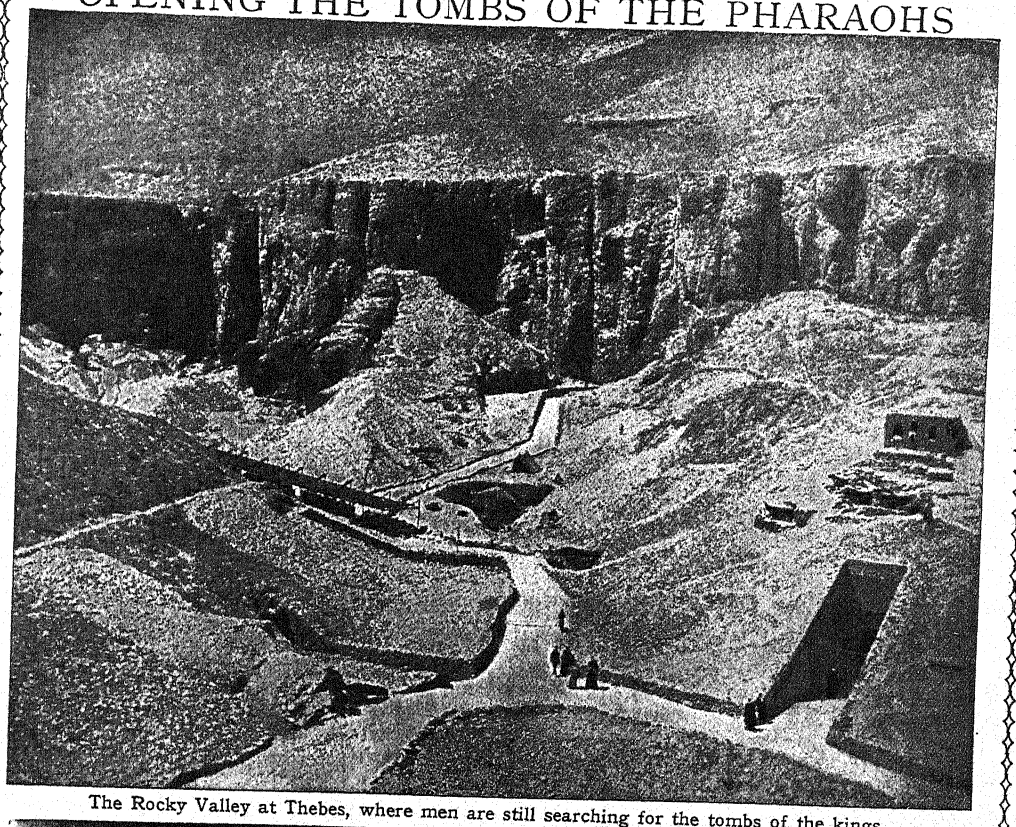
If we look at the walls and columns of the temples, at the solid vaults, at the coffin-cases, at the sculptures and the wall-paintings, we shall find most of them covered with this picture writing. Until a century ago no one could guess what it all meant. Then an engraved stone was found at Rosetta, near Alexandria, now carefully preserved under glass at the British Museum, which has served as a sort of key to unlock the mystery. We see a picture of this stone on page 5603.

HOW MEN SOLVED THE RIDDLE OF THE ANCIENT WRITINGS

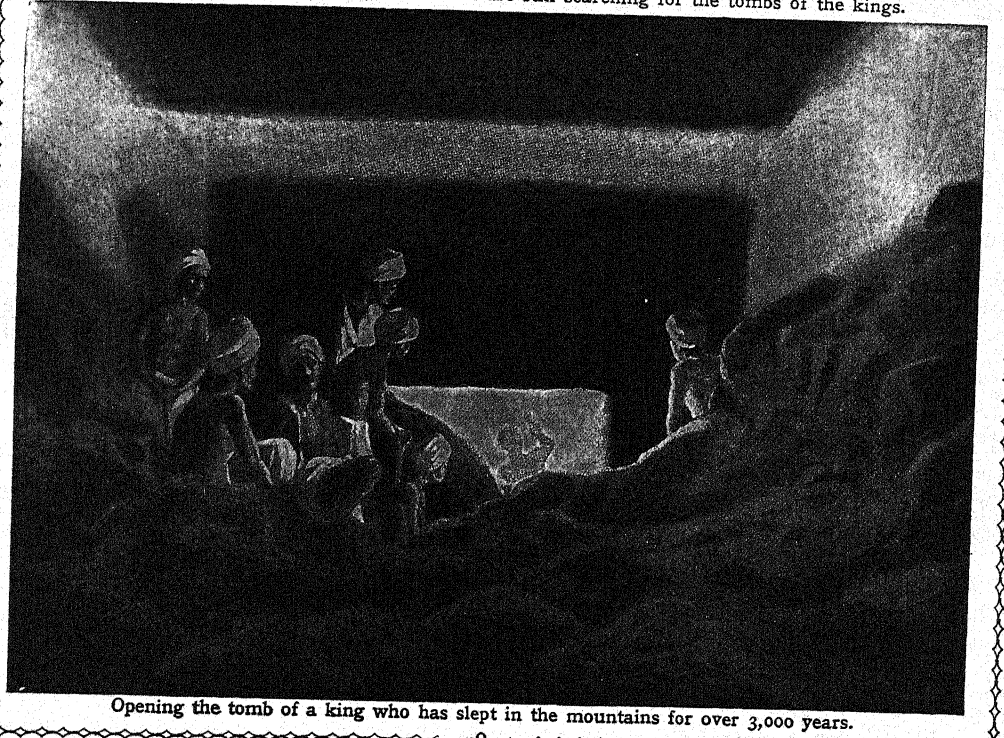
On the stone is a certain decree about keeping a king's birthday, and the same decree is given in three different kinds of writing. The lowest is in Greek, which scholars know well; the top is in the Egyptian picture writing used on the monuments, and the middle one is also in the Egyptian language, but in a more running kind of writing used for everyday purposes by the people.

Learned men, who love to find out the puzzles of the past, set to work to translate this decree. They compared it with certain lists of kings' names they had

OPENING THE TOMBS OF THE PHARAOHS



The Rocky Valley at Thebes, where men are still searching for the tombs of the kings.



Opening the tomb of a king who has slept in the mountains for over 3,000 years.

already studied, till at last it was all straightened out, and the values of the signs discovered, so that we can now stand by and listen to those who know hieroglyphs, as they translate the old Egyptian writings as easily as if they were in English print.

And this discovery and study have also opened up to us the old books and chapters of books constantly found in the tombs. These were in long rolls, or *papyri*, so called from the material on which they are written. This is the inner part of the papyrus reed, that grows in such profusion on the Nile banks, and from which we get our word "paper."

The work of the scribes was to make copies of these papyri. The one most copied is called the Book of the Dead, parts of which are believed to be older than the pyramids themselves. Certain chapters of this book were always laid beside the mummies, to instruct them what to say and how to behave in the underworld. Part of a chapter was painted on the outside of a mummy coffin which is now in the Metropolitan Museum, and this we may learn to read ourselves. There is no end to the interest of the Book of the Dead, not only on account of its entrancing illustrations, but also for the teaching it gives about the religion of Egypt, and how men tried to fit themselves in life for a happy hereafter; and how they expected to be judged, and how they believed they would live and work on their way through the underworld. The British Museum has a fine copy of a large number of its chapters, and we can return to study it again and again, finding something fresh and interesting every time.

Besides this and other religious books, there are many other papyri of great age, and they include fairy-tales, war poems, medical and astronomical books, and also lengthy instructions as to behaviour.

Every year diggings and explorations are being carried on in the search for more temples and tombs, inscriptions and papyri, to fill in the gaps in our knowledge of the story of old Egypt.

AN EGYPTIAN KING WHO REIGNED NEARLY SEVEN THOUSAND YEARS AGO

Scholars are inclined to put back the beginning of that story farther and farther. The first historical king of all Egypt is put by some in the forty-fifth century before Christ. Some think that Menes, who turned the course of the Nile, lived much earlier. Before him there are legends of god-kings and heroes, and kings of small states. Specimens of very old pottery, with pictures upon it of soldiers and boats, strangely like children's drawings of to-day, give an idea of the first known life on the Nile long before Menes.

For the sake of convenience, in dealing with the great number of kings who followed Menes, we generally group them into thirty or more dynasties, or families, and the names are gleaned from the various lists of kings on tablets and papyrus, made from time to time through the centuries, which have come down to us. When looking at inscriptions we can always distinguish royal names, because they are surrounded by an oval line, supposed to be a cord tied in a knot to preserve the name from contact with common ones. This oval is called a *cartouche*. Before the king's name will generally be found some Egyptian words composed of a sign like an umbrella and an insect over two half-circles. These signs mean King of the North and South, for Egypt is such a long, narrow country that it was long divided into two parts, and so we often hear of the Double Crown, which is made up of the red crown of North Egypt, and the white crown of South Egypt.

THE KINGS OF EGYPT WHO CALLED THE SUN THEIR FATHER

Each king also called himself Son of Ra, or the Sun, which is shown by a goose and the round sun with a dot in the middle. The names of the kings are chiefly made up from about a dozen signs, which we meet with continually in every inscription.

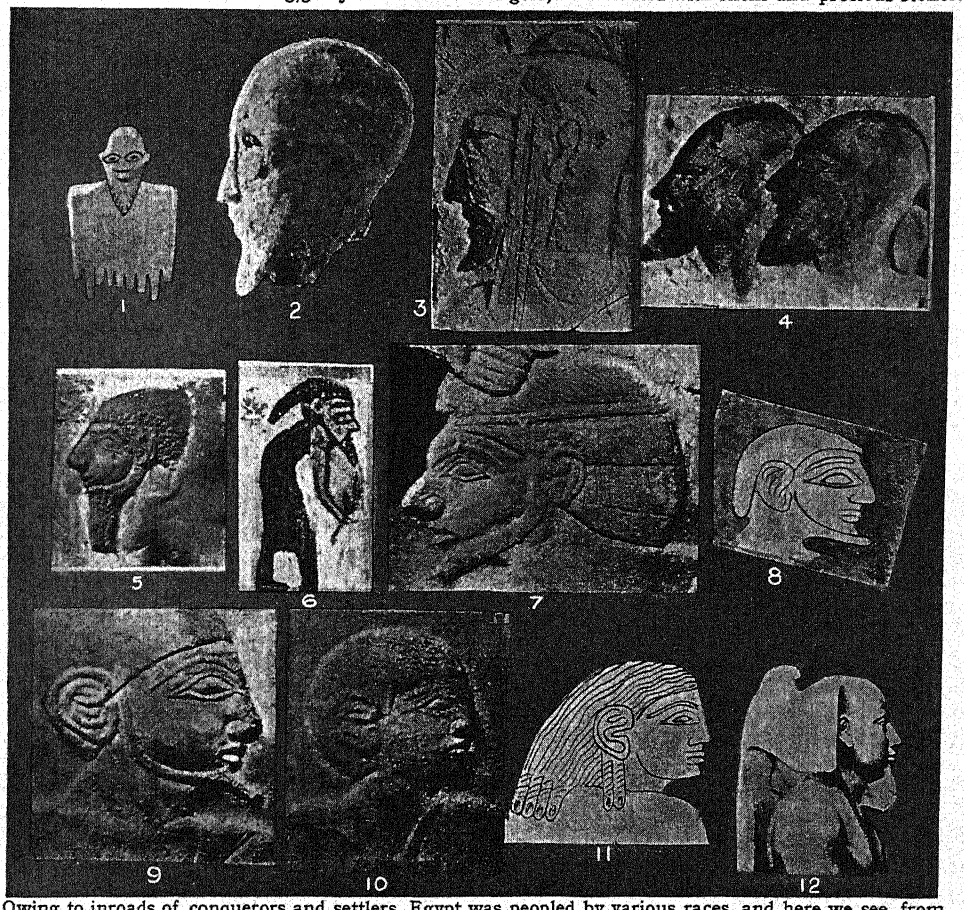
Very little is known of the kings of the first three dynasties. It was under the rule of the fourth, perhaps—some say in the thirty-seventh century before Christ, others 1,000 years earlier still—that the three great pyramids near Cairo are believed to have been built by Khu-fu, by Kha-f-Ra, and by Men-kau-Ra.

If we would see the speaking features of Kha-f-Ra, and note how he sat to give audience to the overseers and officers of his great building works, we can find a cast of his wonderful life-like portrait in the British Museum. There he sits on his throne, surrounded by memorials of

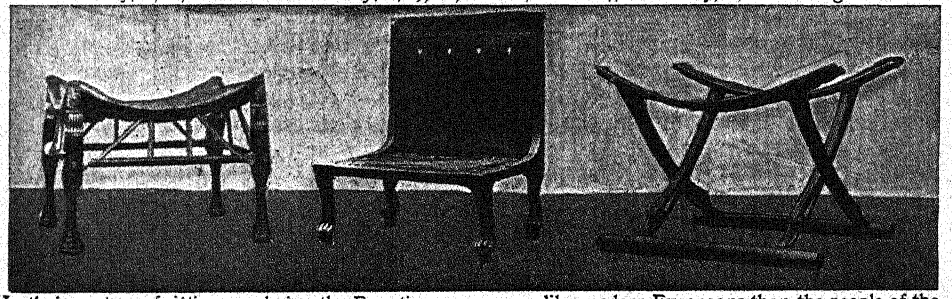
PICTURES OF THE PEOPLE OF OLD EGYPT



Necklaces were an important part of the dress of the ancient Egyptians, and both men and women wore them. Here we see a necklace 3,500 years old. It is of gold, ornamented with shells and precious stones.



Owing to inroads of conquerors and settlers, Egypt was peopled by various races, and here we see, from sculptures thousands of years old, what some of the races were like. Numbers 1 and 2 show the aquiline, or eagle-nosed, type; 3, the Libyan; 4, the Amorite; 5, the curly-haired type; 6, the sharp-nosed type; 7, the short-nosed type; 8, the forward-beard type; 9, 10, and 11, the straight-faced type; 12 is King Kha-f-Ra.



In their custom of sitting on chairs, the Egyptians were more like modern Europeans than the people of the East. Their seats were not unlike ours, as may be seen in the picture from the chair with a back, which is 3,500 years old. The stool on the right folds up like a camp-stool. The other seat is of ebony, inlaid with ivory.

the officials who superintended the building of the second pyramid.

THE MERCIFUL KING, WHOSE BODY WAS LOST AT SEA

Of Men-kau-Ra the museum possesses part of his skeleton and the fragments of his coffin, with the inscription saying he was just and merciful. The rest of the coffin and mummy were lost at sea on the way from Egypt, whence they had been taken from the third pyramid. It is said that the sixty-fourth chapter of the Book of the Dead was compiled in his reign.

Not far from these Pyramids of Gizeh is an enormous monster, hewn out of the living rock, with a human head and the body of an animal—the Sphinx—so large that it could scarcely be got into the largest of our modern buildings. It is now covered with sand up to the neck, and only the immense head shows. From time to time through the centuries, the sand had been cleared away, and the shape shown, as well as the little temple built in between the great paws.

THE GREAT STONE FACE THAT HAS LOOKED UPON THE WORLD FOR AGES AND AGES

The face seems to look out to the horizon, as we can see by the picture on page 4175, changeless through thousands of years, except for the wear of time, and the wanton mischief done to it when Mohammedan soldiers used it as a target. It has a grand majesty of its own, and it has astonished some travelers to notice how like are the thick lips and the cast of face—modeled it is thought, even before the building of the pyramids—to those of some of the country girls of Egypt to-day.

Another striking likeness that connects far-away times with the present is found in the statue of a fat little farmer man, whose amusing face makes us smile; though we feel that his sharp eyes would soon find out any wrongdoing in those he had to oversee—perhaps four thousand years ago. When this statue was raised from the bed of sand and dust, where it had lain for centuries, the watching people called out in amazement: "It is the sheik—the chief—of the village!" And the statue keeps this name now.

HOW ABRAHAM ENTERED INTO THE BUSY LIFE OF THE NILE VALLEY

Many interesting tombs belong to this period of, perhaps, 2,400 before Christ. One of them has wall-paintings, representing the arrival in the country of a family, such as that of Abraham, the great founder of the Jewish race. The story of his visit to Egypt in search of food, when there was a famine in his own country beyond the Isthmus of Suez, is familiar to us in the pages of the Bible.

We can well imagine that Abraham would tell stories of this visit to Egypt to his son Isaac, that he in turn would tell them to his son Jacob, and Jacob to his sons, and, among them, to his favorite, Joseph. We read the story of Joseph when we were small children. Let us follow him again on his sad journey over the "Bridge of Nations" to slavery in Egypt, fitting in all we can to make real the daily life of the handsome lad, so cruelly torn from his home.

Baskets made like those in the Egyptian rooms at the Metropolitan Museum might well have been those which the chief baker carried on his head; the models of the granaries show how corn was stored, and bring to mind Joseph's great work of fighting the famine that lasted so long, because Father Nile brought too much or too little water to the wide fields.

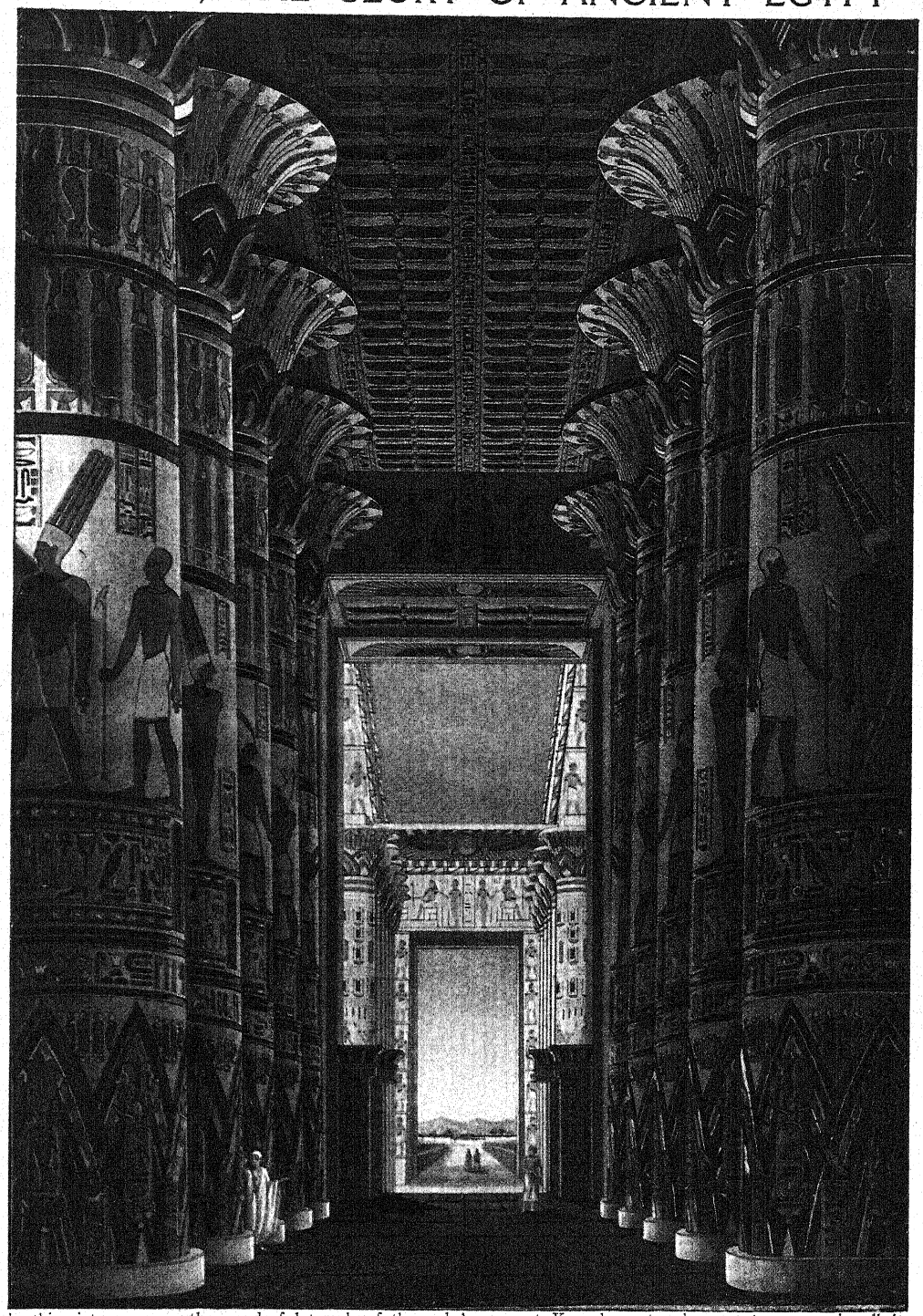
JOSEPH AND HIS BRETHREN AND PHARAOH, WHO WOULD NOT LET HIS PEOPLE GO

Fashions changed so little in Egypt for centuries that we might imagine that the little statue of a treasurer was Joseph himself. We might fancy him earnestly discussing affairs of state with the king to whom he became as a son, or traveling down the Nile on a tour of inspection in a boat like the model in the case near by.

Very little is known concerning the history of Egypt at this time, for the kings who ruled then—believed to be a race of foreigners—destroyed monuments rather than set them up. But when these Hyksos, or Shepherd Kings, passed away, many famous names of builders and soldiers rose up during the years that Israel lived in the "House of Bondage." Among them was King Thothmes III., who inscribed and set up the great obelisks which we call Cleopatra's Needles—though the famous queen lived several centuries later.

One of them now stands in London, the other in New York. Thothmes III. was

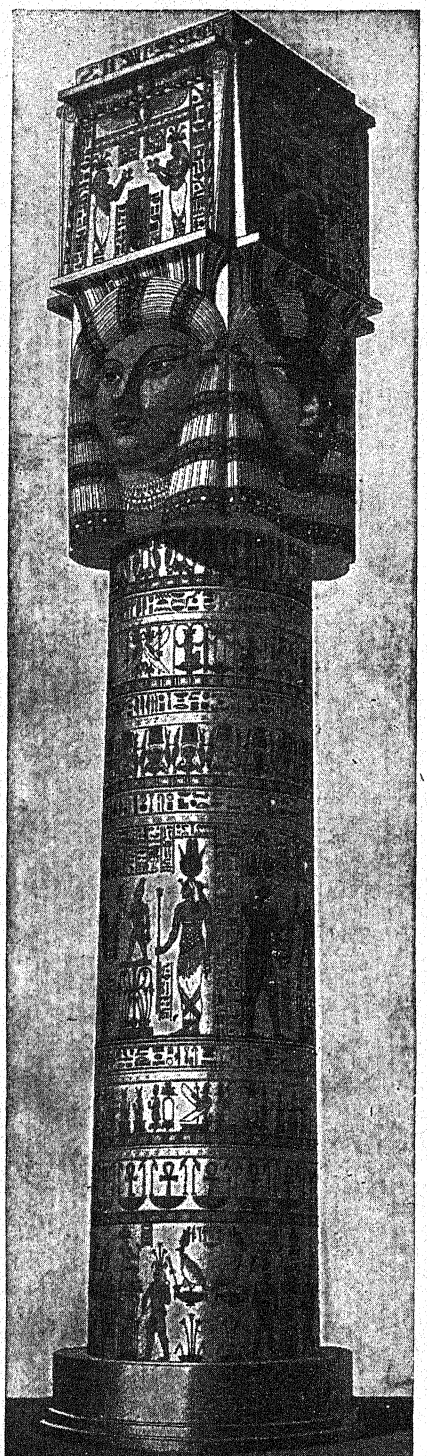
KARNAK, THE GLORY OF ANCIENT EGYPT



In this picture we see the wonderful temple of the god Ammon at Karnak, restored so as to appear in all its ancient glory. It has been described as the noblest effort of architectural magnificence ever produced by the hand of man, and indicates the might and advanced civilization of the ancient Egyptians. An avenue of sphinxes led up to the doorway, and the great hall contained 134 mighty pillars, all brilliantly painted and carved.

one of the first kings of Egypt to make war across the isthmus, both on the nations in the mountains of Syria and in the valley of the two great rivers beyond the desert.

Then there was the great Queen Hatshepsu, who has often been called the Elizabeth of Egyptian history. She sent most interesting expeditions to discover unknown countries, and had an account of them, with fine illustrations, engraved on the walls of a magnificent temple she built near Thebes. But, interesting as is this strong queen, who tried so much to look like a man that she had a beard added to her portraits, we must pass on to the stirring times a little later when the descendants of Jacob, the children of Israel, had grown to be very numerous, and were grievously treated by the kings, or Pharaohs, as the Bible calls them, of the period. Rameses II. is believed to have been the great oppressor of the Israelites, and we can see his face in the huge stone monuments he set up, and more wonderful still is the photograph of his mummy, which has been found with those of many of his race and put into the museum in Cairo. Thus, the features into which so many looked with awe, perhaps the little Moses among them, are shown again to the world more than 3,000 years after the great king's death. In the Metropolitan Museum there may be seen an earthenware bowl, covered with blue glaze, and inscribed with the name of Rameses II., which may have belonged to the great king himself. There, too, is a door lintel taken from one of the temples that he built. As we look at it we wonder how many times his hand may have touched it as he passed in and out thirty centuries ago. Magnificent were the temples and monuments set up by this dynasty of kings, among which we find the massive ruins at Karnak and Luxor, near Thebes. Bricks such as the Israelites made for use in building store cities for their hard taskmasters, necklaces and jewelry such as they may have taken when they "spoiled the Egyptians," are here in the museum before our eyes. In the great museum at Cairo, and in the museums of many European cities, we may find endless objects such as the king's daughter may have provided for Moses, whom she rescued and brought up in the palace itself, with which to frame his life from childhood onwards. The toys and games, especially the animals, must have pleased him, and a garden with trees and a pond, like one that is pictured on a wall, would be de-



This is one of the brilliantly decorated columns in the temple at Dendera, shown on page 4851. There are 24 such columns forming the portico. The temple was finished about 1,900 years ago.

lightful for a child to play in. The little Moses may well have heard music from instruments such as those pipes and harps, and he must have enjoyed sailing and rowing on the Nile, in boats like those model ones on the shelves.

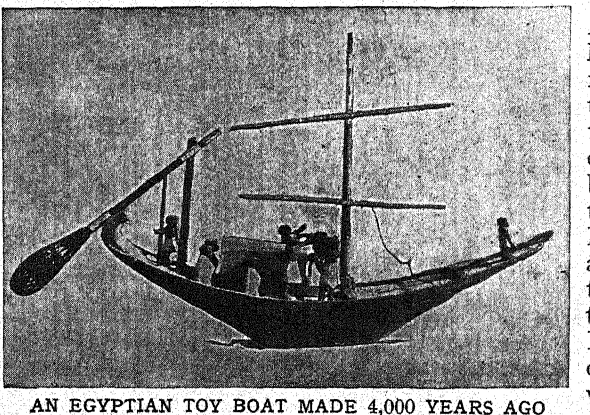


TOYS OF EGYPTIAN CHILDREN 4,000 YEARS AGO

The wall-paintings from the tombs show in their bright colors how the Egyptians amused themselves in the time of Moses, and before and after. There are the gay parties with music and dancing; a father getting birds with a sort of boomerang, the child holding on to his leg for fear of falling out of the boat; the mother gathering lotus flowers; the family cat retrieving the birds three at a time. All this we can see on page 4852. And when the time came for lessons, those reed pens and red and black paints were the sort with which the boy must have learned to write. One can fancy his enjoying the possession of one of those boxes of pens and paint, and see him poring over the papyrus rolls which held so much of the learning of the Egyptians. The Ten Commandments, brought down from Sinai by Moses after he had left Egypt, are all shadowed in the forty-two commandments of the Book of the Dead. The making and worship of the Golden Calf, which so angered the great leader, was suggested by the ancient worship of Egypt, brought home to us in endless forms by paintings and images of every description, as well as by the mummied forms of the animals held in such sacred reverence. For about 1,000 years after this brilliant line of the Rameses dynasty, the history of Egypt, on the whole, was one of gradual decline and gathering trouble. It was during this time that the priests of the splendid temples became richer and richer and even more powerful, till at last they made themselves kings. When examining the mummies and their cases, we notice how many belong to priests and priestesses, door-keepers, incense-bearers, and other officers of the great religious colleges. Dynasties of foreigners followed the priest-kings, and the country was breaking up into little states, and everything going down, when the kings of Assyria — the land of the two rivers — saw their opportunity for conquest, and began to attack Egypt on her own frontier, and then pushed their way over the Bridge of Nations. They overran the whole of the country, spoiling the harvests, so that the people starved, and the fine temples and monu-

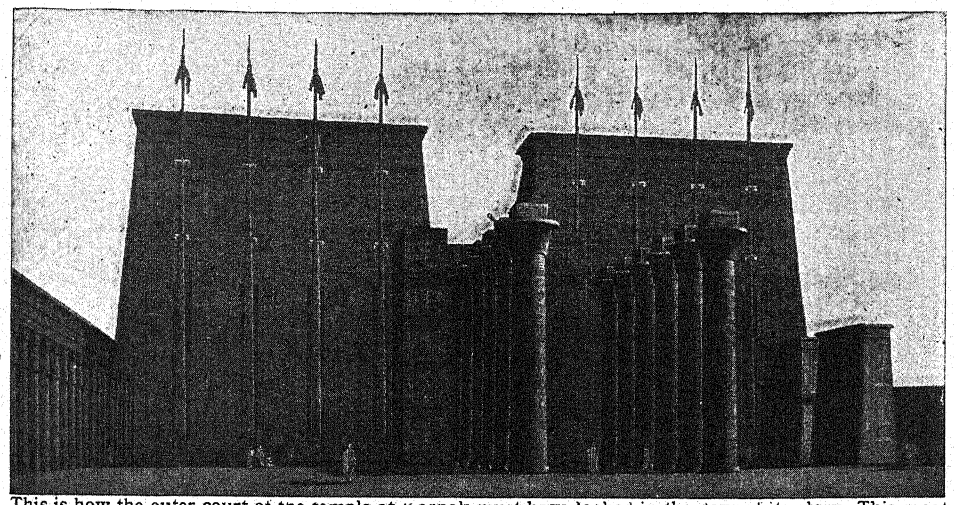


A DRESSING-TABLE 3,500 YEARS OLD

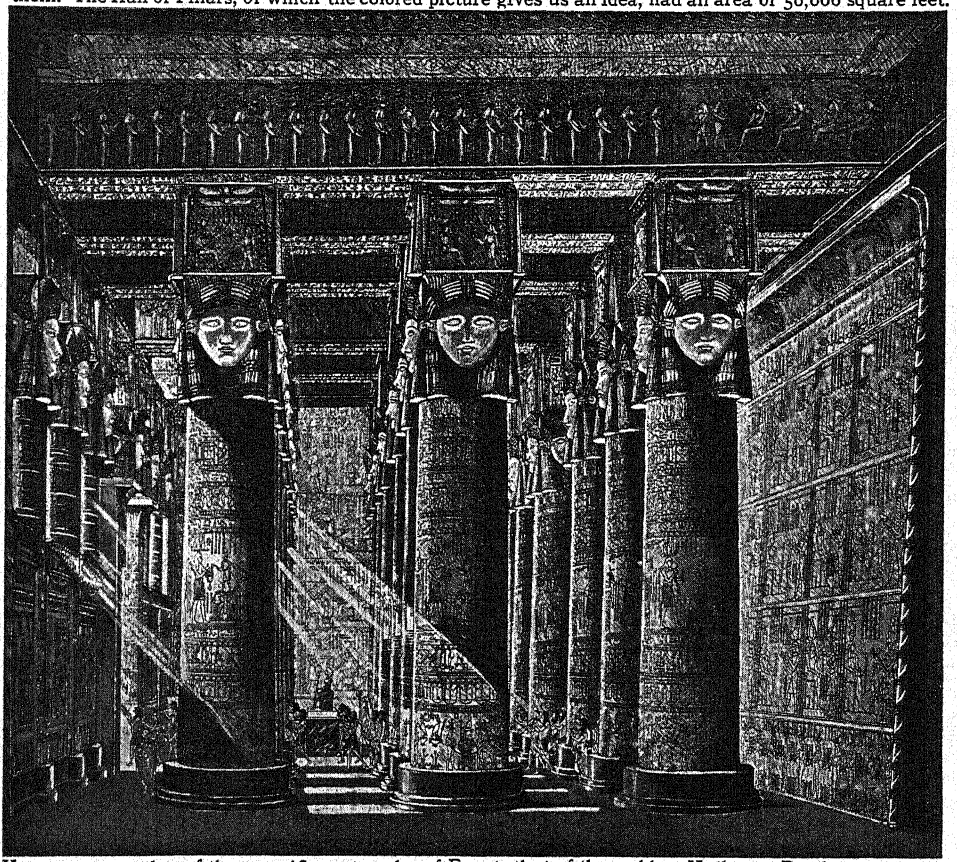


AN EGYPTIAN TOY BOAT MADE 4,000 YEARS AGO

THE MIGHTY TEMPLES OF ANCIENT EGYPT



This is how the outer court of the temple at Karnak must have looked in the days of its glory. This great temple was the work of several kings, during a period of many years. The entrance to the Hall of Pillars was through the double row of pillars in the centre of the picture and the great gateway beyond them. The Hall of Pillars, of which the colored picture gives us an idea, had an area of 50,000 square feet.



Here we see another of the magnificent temples of Egypt, that of the goddess Hathor at Dendera, restored. It is shown as it was when used for royal worship. This is not one of the most ancient buildings, being erected in the days of the Ptolemies, long after the rule of the Pharaohs had passed away. Through the massive, stately pillars, which bear the face of the goddess at their head, we catch a glimpse of a procession of priests.

ments began to fall into decay. We find the account of all this misery in the story of Assyria, where we find the description given by the conquerors with so much pride of their successes in Egypt. Egypt revived after this for a little while, only to be again devastated from end to end by the Assyrians, till they, too, fell under a new great power that arose in Asia, that of the Persians.

The Egyptians took every opportunity to revolt against the Persians. Between the second and third revolts, in the fifth century before Christ, a traveler came to Egypt, notebook in hand, for he was an author, anxious to collect material for his History of the Persian Wars. This was Herodotus, the Father of History, who set down in a pleasant, chatty way his impressions of the wonderful country, of the Nile in flood, of the pyramids, and other great buildings. Much of this interesting book we can read to-day, though Herodotus laid down his pen more than 2,000 years ago.

The Persians, in their turn, were driven out by the world-conqueror, Alexander the Great, of Greece. His stay was but short in Egypt; but his brilliant passage has left marks for all time. He flashed across the desert to worship at the shrine of the god Jupiter Ammon, whom he claimed as an ancestor, and he planned and founded the great city of Alexandria, called after him, which, under his successors, became one of the most important cities in the world.

Three centuries before Alexandria an Egyptian king had employed Greek soldiers and allowed Greek traders to settle in the Delta. Before this, Egypt had been closed to foreigners, much as China was till lately; but these Greeks found their way into the country, and, little by little, their cleverness in trade, their wonderful power in art and in learning, spread Greek influence ever farther along the Nile. Naucrates became a famous Greek city during this time, and to-day explorers find much Greek treasure of all kinds buried in various parts of the Nile delta.

The kings who succeeded Alexander were the Ptolemies, the first of the name being one of Alexander's generals. They were great builders and restorers, and to them we owe the Temple of Edfu, and the temples on the Island



This picture, drawn by Egyptians thousands of years ago, shows an Egyptian catching birds from a boat, while his little child holds his leg for fear of falling into the water. The mother is gathering lotus flowers.

of Philæ, near the great dam at Assuan. The Ptolemies also favored the city, named Alexandria after the founder of their fortunes, and started in it the immense library, afterwards unhappily burned, also the university, to which came some of the most famous Greek scholars. Another Ptolemy built the tall lighthouse, said to be three times as high as the Monument in London, and, like the pyramids, one of the wonders of the ancient world. The flare from its top guided the shipping of Alexandria safely into its double harbor for long years, but not a trace of it now remains. The same Ptolemy caused the Old Testament, originally written in the Hebrew language, and understood only by comparatively few people, to be translated at Alexandria into Greek, the beautiful language which was soon to to be carried over the known world, and become the language of scholars everywhere. Another good work of this same king was to cause an Egyptian scribe named Manetho, who knew Greek well, to write in that language a history of Egypt and its religion, and though his actual records have been lost, other writers have copied from Manetho, and thus the lists of kings and other particulars he so carefully compiled have been of great use.



The sloping gallery of the Great Pyramid, leading to the chamber where a Pharaoh was buried.

The Rosetta stone was set up in the reign of Ptolemy V. We see now how it was that a Greek translation came to be put below Egyptian writing. Both languages were then in use in Egypt. And all the time that Egypt was becoming more and more Greek, "a shadow ever lengthening towards the East" was slowly creeping onwards from Rome; it passed over Greece itself in the middle of the second century before Christ, and reached Egypt about a hundred years later.

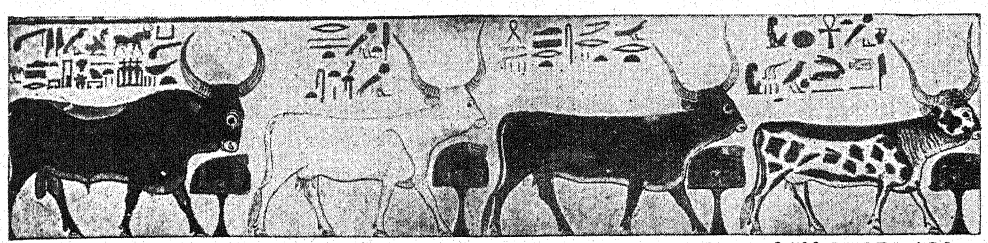
It is a sad and absorbing story how the end of the independent kingdom came, and how it passed into a Roman province. Shakespeare has founded one of his great plays upon it, the play of "Antony and Cleopatra." The beautiful Cleopatra was the last great ruler of the line of Ptolemies, and, sooner than fall into the hands of the invading Romans, she is said to have allowed a deadly serpent to bite her. So when they came to her palace they found her in all her regal splendor—but dead. In Tennyson's words, Cleopatra says:

> I died a queen. The Roman soldier found
> Me lying dead, my crown around my brows,
> A name for ever.

From Menes to Cleopatra, what a perspective of years! Fifty centuries and more before the birth of Christ, 7,000 years ago, all full of work, full of struggle and every kind of human interest, full of happiness and sorrow.

We have but to look at the vast view again, and much of the old life will become so vivid and real to us that we can almost hear the dancing feet of the children at play in the little worn shoes, and the sad wail of mourners carrying the mummy to its hidden tomb.

THE NEXT STORY OF COUNTRIES IS ON PAGE 4957.



A PICTURE OF THE CATTLE OF ANCIENT EGYPT, DRAWN ON A TOMB 3,500 YEARS AGO

FABLES OF ÆSOP THE SLAVE IN FRENCH

The English versions of these fables are in the part of our book beginning on page 2953.

LE LOUP ET LE CHEVREAU

UNE chèvre, qui sortait pour chercher de la nourriture, enferma son jeune chevreau à la maison et lui recommenda



de n'ouvrir la porte à personne jusqu'à son retour. Le loup était caché derrière un buisson, et entendit ce qu'elle dit. Aussitôt qu'elle fût partie, il alla frapper à la porte, puis, imitant la voix de la chèvre, il cria au chevreau d'ouvrir la porte. Mais le chevreau qui regardait à travers le trou de la serrure, vit que ce n'était pas sa mère ; il cria au loup de s'en aller, en disant que bien qu'il imitât la voix de la chèvre, il avait trop l'apparence d'un loup pour inspirer confiance.

N'ayez jamais confiance en ceux qui prétendent être différents de ce qu'ils sont en réalité.

LE FERMIER ET LA CIGOGNE

UN fermier tendit un filet dans ses champs, un jour, pour attraper les grues et les oies qui venaient manger le grain nouvellement semé. Plusieurs



de ces oiseaux furent pris dans le filet et parmi eux il y avait une cigogne, qui plaida vivement pour sa vie, en disant au fermier qu'elle n'était ni une oie ni une grue, mais une pauvre, inoffensive cigogne ; qu'elle n'était pas pour venue voler le grain, mais qu'elle avait simplement accompagné les autres oiseaux.

" Tout cela est peut-être très vrai," répondit le fermier, " mais comme je t'ai prise avec les voleuses, tu dois subir le même chatîment."

Si nous nous associons avec de mauvaises gens, nous devons nous attendre à en subir les conséquences.

LE CERF SE MIRANT DANS L'EAU

UN cerf, buvant au bord d'un étang, vit son image dans l'eau, comme dans un miroir. Il s'admirait et hit : " Oh ! quelle belle paire de cornes je possède ! Avec quelle grâce elles s'élèvent au dessus de ma tête et comme elles rendent ma tête belle. Je voudrais que le reste de mon corps fût aussi beau ; mais j'ai des pattes si longues, si maigres que j'ai vraiment honte qu'on les voie."



A ce moment, on entendit le bruit de quelques chasseurs et d'une meute. Le cerf effrayé s'enfuit, et bondissant agilement sur ses pattes maigres, il laissa bientôt les hommes et les chiens derrière lui. Puis il s'élança dans un bois pour se cacher, mais à l'entrée du bois, ses cornes furent prises dans des branches et il fut maintenu jusqu'à l'arrivée des chiens qui le tuèrent.

En mourant, il dit : " Oh ! que je suis malheureux ! Je vois maintenant que les cornes dont j'étais si fier, sont la cause de ma mort, tandis que mes longues jambes minces, que je croyais si laides, auraient seules pu me sauver."

Souvent, les choses que nous préférons ne sont pas les meilleures pour nous, tandis que certaines choses que nous n'aimons pas sont utiles et précieuses.

WHAT THIS STORY TELLS US

WE know the great difference between seeing and perceiving, and we must now consider the memory, without which there could be no real perceiving. It is just because memory makes perceiving and even higher things possible that its importance is so tremendous. If we could not remember, we should be nothing. Without memory there would be no recognizing, there would be no learning, no knowing. We are so accustomed to use this power of memory that, until we think, we cannot realize what we should be without it. We see something coming along a road, far away, and then, after a while, we perceive that it is a human being. Later, by the dress, we can tell that it is a man and not a woman, but who it is we cannot tell. Finally, we find that it is someone we know. Here we see that the memory acts even in the simplest kinds of perceiving, and that it is worth while to devote some time to the study of it.

HOW TO REMEMBER

CONTINUED FROM 4750



NOWADAYS, in dealing with such a great question as that of memory, we do not make the absurd mistake of trying to understand our memories without studying every kind of memory wherever we can find it; and the first great discovery we make is that, in some degree or other, memory is a property of every kind of living creature. Formerly it was said that memory was a property of every kind of nerve and nerve-cell, and that is perfectly true, but it is not the whole truth.

During late years men have studied the behavior of humble forms of plants, and of animals so simple and lowly that no nerves or nerve-cells are as yet developed in them. Yet even here, almost at the beginnings of life, long before there is the least shadowy hint of even the simplest kind of brain, we find some proofs of memory.

All living matter is called protoplasm, and it is a fact that memory is a property of all living protoplasm everywhere. No matter how simple creatures are, we find that their behavior can be made to change by changing their surroundings. This means that in some degree they remember; they act differently because something has occurred perhaps three times before, and the fourth time it occurs they do not behave exactly as they did the first time. What it is in living matter, whether of a nerve-cell or of any other kind of cell, that enables it to remember, we cannot say; neither can we say in advanced cases of memory, as when we remember an idea. But even in the humblest cases of memory, as where an animal behaves differently towards light because it is the second time and not the first time it has seen it, we can only guess what happens. The light the first time somehow made some kind of mark, as we might say, in the living cells, and altered them, so that the next time the light came they were different.

It is supposed by many people that living matter never forgets. When we say we forget, what we mean is simply that we cannot recall. But the thing we say we forget is still there in our mind, and when someone names it we recognize it; if we had really forgotten we should not recognize it.

But even where we cannot recall a thing for ourselves, and where we cannot recognize it when it is recalled for us by somebody else, it by no means follows that we have really forgotten. There are many cases on record where a man appears to have utterly forgotten, for instance, certain words of some language

which he learned and spoke when he was a child; he cannot recall them, and they mean nothing to him when they are recalled; but he proves that they are still there in his mind when, perhaps, he is suffering from a very severe illness. His brain is greatly upset, and these words, which he may not have heard or used for fifty years, or more, come from his lips. Very likely they are used without any sense, and he does not know what they mean, but there they are. The brain has not really forgotten them.

THE DIFFERENCE BETWEEN REMEMBERING AND RECALLING

Such cases as these teach us that in all probability living matter does not forget, but, more than that, they show us that what we call memory is very far from being a simple, single thing. In what we call an ordinary act of memory there are three things involved. There is the pure remembrance, with which we have not much more to do than a table has to do with remembering a dent made in it; there is the recognizing of what we remember; and there is the power of *recalling*. Everyone who has been asked at an examination, "What is this?" and who knows perfectly well that he has seen it a hundred times before, but cannot put a name to it, knows that memory is not such a simple thing as we sometimes suppose.

But in every act of memory the beginning of it is the making of an impression on the brain. No doubt this is a very different thing from making a dent on a table, but we do no harm if we think of it as if it were something like that; and, indeed, the only word which we can use to describe it, such as the word *impression*, which just means "pressing in," suggests a comparison of this kind. Now, as this is the beginning of all memory, and as memory is the beginning of everything that makes us human, it is very important for us to know how far and in what way we can improve this power of ours.

WHEN THE POWER OF THE MEMORY IS AT ITS BEST

We shall make nothing but mistakes unless we learn, first, to distinguish this part of memory from the other parts; and, secondly, to discover any natural changes in this power during the time that we grow from childhood to age. It is very likely that, on the whole, memory is at its greatest when we are young, and tends to diminish steadily as we grow old. There is an apparent exception to this, because at certain ages boys and girls seem to be able to learn poetry and many other things by heart with greater ease than they could have done a year or two before. But this is because the brain is, as it were, just being finished in its making. It is likely, on the whole, that after that the power of being impressed steadily diminishes.

This explains to us some facts about memory which seem peculiar. For instance, we know that, in a general way, we are more likely to remember things that have recently happened than things that happened long ago. This is probably only because the things that happened long ago are lower down in the mind, so to speak, and have been overlaid by many newer things.

WHY OLD PEOPLE REMEMBER BEST THE THINGS OF LONG AGO

Now, we often find that old people, instead of remembering the latest things best, remember them very badly; but, though they are doubtful about recent events, they remember quite clearly something that happened perhaps many years before. The explanation is that the newer impression was made on a brain that was losing its power of being impressed, but the older one was made on a young and very impressionable brain; and the passage of time has not destroyed the deep impressions made in youth.

When we compare different people, we find that there are differences between them in this quality of memory. It is supposed by nearly everybody that education accounts for these differences, and makes them. So one of the great objects of education is to "train the memory." But, if by training the memory we mean making the brain more impressionable than it is by nature, nothing can be more certain than that this was never yet done by any kind of education, and never will be.

To begin with, these differences between people are natural. The amount that a man remembers will, of course, depend upon the amount that he has tried to remember, and so his education is immensely important, because it

largely means giving us opportunities for remembering. But that is an absolutely different thing from any effect in actually improving the power to remember, so far as this first part of memory is concerned.

THE ONLY EXCUSE FOR LEARNING A THING BY HEART

The differences between people in this respect are enormous, but they are natural differences, and we simply have to accept them as they are. Of course, they make a tremendous difference in our lives, because we have seen that memory is the basis of everything else; and though different kinds of memory are needed for different people—as, for instance, the painter, the engineer, and the musician—yet these differences in memory are the beginnings, at any rate, of the differences in what the people achieve.

It is quite certain, then, that the brain's natural power of being impressed cannot be increased by any of the methods which have been too long adopted for that purpose. There may be a good reason for learning by heart, simply because there are things which it is well to have in the mind, and which can be made to stick by repetition. But no kind of learning by heart increases the brain's power of retaining things. Learning by heart does not train the memory; it very often disgusts the mind and disheartens it from thinking.

The only possible defence for learning anything by heart is that the thing is worth knowing. There are plenty of such things, and the time will come when we shall carefully take children at just those ages when learning by heart is easiest, and deliberately use those years to put into their minds the best possible selection we can make of the things which everyone ought to know.

THE THINGS THAT WE MUST KNOW AND THE THINGS THAT WE SHOULD KNOW

There are things that people must know, and there are things that they should know, if possible. The number of these things is a million times greater than could be remembered by the wisest and most learned man that ever lived. We must therefore do our best for each child, and that best will mean the careful selection of the things it should learn and the using of the time when remembering is easiest. We must break up and vary the lessons so as to avoid fatigue, because when fatigue begins, memory ends. Though education cannot improve the natural memory, yet there are certain things which education, in the widest sense of the word, can do or fail to do. Whatever the brain is meant to be by nature, and whatever is in its power to become, yet the building and the health of its cells and nerves, and therefore the success of their duties, depend upon the supply of blood they receive, and upon their never being subjected to over-use.

What we call education, which is sometimes just the opposite of real education, very often means that we injure the brain and spoil the memory at the very time when we think we are training it. School hours are often too long; no child should attend to one thing for so long as an hour, or anything like it. Light, and especially air, may be defective. Foul air means foul blood, everywhere and always; and foul blood means that the brain also is being fouled and poisoned.

A HEALTHY OUTDOOR LIFE IS THE BEST AID TO MEMORY

Our great business, therefore, in taking care of our memories when we are young, is to lead healthy lives as much in the open air as possible; and no doubt we shall find that, in after years, for every one thing we remember that happened indoors when we were children, we shall remember two things that happened out-of-doors.

Now, we must study the laws of the mind as far as possible, in order to see whether there are any laws which will help us to get the most into the mind with the least trouble. We know that the memory is at its best in youth, so that on this account, if for no other reason, youth is the time to learn; and we have also noticed that, as a rule, for each boy and girl there comes at some time or other a period of a few years during which learning by heart is particularly easy. Many grown-up people of to-day are grateful to those who taught them, at this age, such things as parts of the Bible and good poetry, which are precious possessions of their minds for the rest of their lives.

Next we have to consider the various special methods of impressing the memory. The first of these is the

method of repetition. We all know that repetition helps us to remember, and, indeed, this method of going over a thing again and again is the one which has been most believed in since teaching began. This applies equaly to our learning-memory and our doing-memory, as we recognize when we say that practice makes perfect. Now, so long as we clearly understand that repetition and learning by heart do no good to the memory itself, but merely help to impress it, we are quite right to use this method, and there are certain things well worth noticing.

THE BEST WAY OF REMEMBERING WHAT WE HAVE HEARD

One of the great methods of learning is to listen to something spoken and take notes of it. Now, in such cases we notice that the two processes of listening and writing down, and of reading over, result in much better remembering if they are close together. If we read our notes the same day as we take them down, we shall remember more a month hence than if we go over them a few days later. When the repetition comes close on the first impression, it is as if the iron were made hot by the first impression, and the second impression is more effective than if we wait for the first to cool.

Another most important fact is that one kind of repetition is very different from another, and this is one of the mistakes that almost all of us make. We may hear without "taking a thing in"; we may read or write a thing, or we may repeat it out loud, while our attention is somewhere else. In such cases all our labor is wasted, as certainly wasted for remembering the thing as it is wasted for "training the memory." It is no use trying to learn when we are tired because the lesson has gone on too long, or when we are feeling cold or thirsty or hungry.

WHY READING HELPS US TO REMEMBER BETTER THAN WRITING

When we are really ill, it is not possible to attend or, as we say, take a thing in. One thing is certain, and it has been proved in every possible way a million times—that repetition without attention is useless. It is very probably worse than useless, for it makes the brain less able to attend on other occasions, even apart from the waste of time. It is worth noting that intelligent, careful, attentive reading of anything is a more effective kind of repetition than copying it out, though we should not suppose so. In copying out, as a rule, too much of our attention is devoted to the mechanical part of what we are doing, and so we are not really attending so well, though we seem to be working harder.

The secret of mere remembering lies, on the whole, more in attention than in anything else. It is most difficult to find out exactly what attention is, and exactly what happens when we attend. The difference between attending and not attending is probably that, when we are not attending, the disturbances that reach the brain from the outside world are scattered in all sorts of directions throughout the brain. The effects of them are almost wasted, because they scarcely go anywhere in particular; and it may be also that perhaps the most important parts of the brain, when we are not attending, are really not in action at all, so that the results of what is going on never reach them.

THE BAD EFFECT UPON THE MEMORY OF CONSTANTLY REPEATING A THING

But when we attend it is probable not only that the highest parts of the brain are in action, but also that everything is carefully arranged and ordered, so that what comes into the brain shall take a definite path, reach a definite place, and do definite things there. It is worth noticing that repetition tends to take the edge off attention, and that is one of the objections to it. As a rule, the more we repeat, the less we attend, and therefore the less result do we get.

If attention is the secret of memory, we must find out, if possible, what is the secret of attention. Repetition, we know, is certainly not the secret. The real secret of attention is interest, and so interest is the real key to successful remembering. When we are interested and attend, the eye is sensitive, the ear strains to hear, and the rest of the body is kept perfectly still, so that nothing shall interfere with our hearing or seeing, and thus the impression is more vivid. We all know that this is the case by our own experience, for when we have been listening to an interesting lecture, our whole mind has been alert, and we have remembered what we heard.

THE NEXT PART OF THIS IS ON PAGE 4995.



THE SILENT PRINCESS

CONTINUED FROM 4787

A CERTAIN king who had twelve sons was so eager to have a daughter that he consented to slay every one of the young princes if only he might have a daughter sent him in their stead.

When the queen heard of this bargain which her husband had made with the King of the Dwarfs she wept bitterly, and declared that no daughter could make up to her for the loss of her handsome sons.

The youngest son, finding his mother in tears one day, inquired what grieved her.

"Alas!" she answered, "the king, your father, has bartered your lives for the sake of a baby girl who will shortly be born. On the day she arrives you are all to be put to death."

"Do not weep," replied the young man. "We will go away and hide so that our father's threat may not be fulfilled."

Before long the baby princess was born, and so fair and sweet was she that she quickly won the hearts of all about the court. She was always dressed in white, and on her forehead hung a golden star, as golden as the beautiful hair that fell in silken tresses about her lovely neck and shoulders.

As the years rolled by the lovely girl grew into a beautiful young woman, with whom more than one prince fell deeply in love. But she would listen to none of them, and was as happy as the day was long until by chance she learned the story of the fate of her brothers. In an idle mood she had found her way to a disused attic room, and there, at the bottom of an old dusty box, she had come upon twelve little shirts. Carrying them to her mother, she asked to whom they belonged. "They are much too small to fit my father," she said.

At this the queen burst into tears, and related the whole of the sad story.

"Oh, how cruel!" exclaimed the princess when she knew all the story. "But do not weep. I, who have been the cause of so much sorrow, will go in search of my poor brothers."

So, with the twelve little shirts in her hands, she set out. For a whole day she traveled through the woods, and at dusk she met a young man who stood amazed to see so lovely a maiden unattended in such a place. He asked if he could help her, and thereupon the princess explained that she was seeking her brothers, who many years before had been compelled to take refuge in the woods.

"I know not even if they be still alive," she said; "but it was for my sake that they left their home, and I am seeking them in the hope that I may be able to make their exile a little less lonely. See, here are the small shirts which they used to wear when they were very young."

As soon as his eyes fell upon the shirts the young prince recognized them.

"My dear little sister," he cried, embracing her, "you are indeed our deliverer!" And, taking her hand, he led her to a little wooden hut, very empty of all save the barest necessities.

By-and-by the other brothers returned, and they, too, welcomed their sister gladly. But one day, as they all sat by the fire, the princess noticed twelve tall lilies growing together in the garden, and she ran out and plucked them, meaning to give one to each of them. But the flowers were magic flowers, and as she picked them the twelve brothers changed, one by one, into great blackbirds, which flew off without a sound into the forest. At the same moment the little house disappeared, and the princess found herself alone in the midst of the wild woods.

Instead of giving way to despair, however, she bravely set out to find a path, but before she had gone far she came upon the cruel King of the Dwarfs.

"Is there no way by which I can rescue my brothers?" she asked.

"There is only one way by which you can break the spell," answered the dwarf; "and that is by remaining dumb for seven years."

Terrible as this condition was, the princess was determined to carry it out. So she found a high tree, and seated herself in one of the branches. But that very afternoon the king of that country rode by, and as he passed the foot of the tree he looked up, and instantly fell in love with the beautiful maiden with the golden star upon her forehead.

"Will you be my bride?" asked the king in a soft voice.

The princess gently nodded her head; but not a word did she utter. So the king, greatly astonished, lifted her down, set her on his horse, and carried her away to his palace. Here they were married in great state, and they lived together for six happy years.

Now, the king had a mother, who was terribly jealous of the young girl, and was wicked enough and cruel enough to invent all sorts of untrue stories about her.

For a long time the king had refused to believe any ill of his gentle lady; but the old queen so persisted in her stories that he at last begged his wife to speak, if only one word, to deny them. But still she kept silence, until even the king himself began to doubt her innocence, and the day came when he consented to have her put to death.

A great fire was kindled in the courtyard of the palace, and the innocent young queen, tied hand and foot, was waiting to be thrown to the flames, when suddenly the sky darkened, and, to everybody's amazement, twelve great blackbirds flew down. At that very moment the seven years expired, and the blackbirds changed into twelve handsome young men, who had come to release their sister.

The happy queen, who was now free to speak, ran to the palace, where the king sat alone in his grief, and related all that had taken place. The king was overjoyed at her news, and, embracing her, begged her forgiveness.

Great rejoicings took place at the palace that night. The old queen was instantly banished from the kingdom, and the young queen, with her husband and her twelve handsome brothers, lived happily together all their lives.

THE CUNNING FARMER AND THE DWARF

A FARMER, whose land included a little hill, decided that this should not lie idle, and so began to plough it up. Immediately a dwarf who lived in the hill came out and angrily asked how the farmer dared to plough on the roof of his house, and disturb his rest. The farmer apologized very humbly, and then suggested that it was to the interest of both of them that the hill should be ploughed, and crops grown.

At first the dwarf would not agree, but the farmer did his best to persuade the little man. He offered to do all the work himself, if the dwarf would agree that the first year the farmer should have what grew above the ground, while the dwarf had all below the ground, and the second year the farmer should have what was below and the dwarf that which was above.

The dwarf was quite willing to fall in with this arrangement; but the cunning farmer planted corn the first year, and left the roots for the dwarf, while he took the grain, and in the second year he planted carrots, and left the tops for the dwarf, while he took the roots.

HOW RIP VAN WINKLE WENT HOME

AS Rip Van Winkle approached the village after his long sleep, about which we read on page 4779, he met a number of people, but none whom he knew, which somewhat surprised him. Their dress, too, was of a different fashion from that to which he was accustomed. They all stared at him with equal marks of surprise, and whenever they cast their eyes upon him invariably stroked their chins. The constant recurrence of this gesture induced Rip involuntarily to do the same, when, to his astonishment, he found his beard had grown a foot long!

He had now entered the outskirts of the village. A troop of strange children ran at his heels, hooting after him and pointing at his grey beard. The very village was altered; it was larger and more populous. There were rows of houses which he had never seen before, and those which had been his familiar haunts had disappeared. Strange names were over the doors, strange faces at the windows—everything was strange.

His mind was now troubled; he began to doubt whether both he and the world around him were not bewitched. Surely this was his native village, which he had left but the day before. There stood the Catskill Mountains; there ran the silvery Hudson at a distance; there was every hill and dale precisely as it had always been.

Rip was sorely perplexed. "That flagon last night," thought he, "has addled my poor head sadly!"

It was with some difficulty that he found the way to his own house, which he approached with silent awe, expecting every moment to hear the shrill voice of Dame Van Winkle. He found the house gone to decay—the roof fallen in, the windows shattered, and the doors off the hinges. A half-starved dog that looked like Wolf was skulking about it. Rip called him by name, but the dog snarled, showed his teeth, and passed on. This was an unkind cut indeed. "My very dog," sighed poor Rip, "has forgotten me!"

He entered the house, which, to tell the truth, Dame Van Winkle had always kept in neat order. It was empty, forlorn, and apparently abandoned. The desolateness overcame all his fears; he called loudly for his wife and children; the lonely chambers rang for a moment with his voice, and then all again was silence.

He now hurried forth and hastened to his old resort, the village inn, but it, too, was gone. A large rickety wooden building stood in its place, with great gaping windows, some of them broken, and mended with old hats and petticoats, and over the door was painted: "The Union Hotel, by Jonathan Doolittle." Instead of the great tree that used to shelter the quiet little Dutch inn of old, there was now reared a tall, naked pole, with something on the top that looked like a red nightcap, and from it was fluttering a flag, on which was a singular assemblage of stars and stripes.

All this was strange and incomprehensible. He recognized on the sign, however, the ruby face of King George, under which he had smoked so many a peaceful pipe; but even this was singularly altered. The red coat was changed for one of blue and bluff, a sword was held in the hand instead of a sceptre, the head was decorated with a cocked hat, and underneath was painted in large characters: "GENERAL WASHINGTON."

There was, as usual, a crowd of folk about the door, but none that Rip recollected. The very character of the people seemed changed. There was a busy, bustling tone about it, instead of the accustomed drowsy tranquillity.

Rip looked in vain for the sage Nicholas Vedder, with his broad face, double chin, and long pipe, issuing clouds of tobacco-smoke instead of idle speeches; or Van Bummel, the schoolmaster, doling forth the contents of an ancient newspaper. In place of these a lean, pale-looking fellow, with his pockets full of handbills, was talking vehemently about the rights of citizens, elections, members of Congress, liberty, Bunker's Hill, heroes of seventy-six, and other words which were a perfect puzzle to the bewildered Van Winkle.

The appearance of Rip, with his long, grizzled beard, his rusty weapon, his uncouth dress, and an army of women and children at his heels, soon attracted the attention of the tavern politicians.

They crowded round him, eyeing him from head to foot with great curiosity. The orator bustled up to him, and, drawing him partly aside, inquired on which side he voted. Rip stared in vacant stupidity. Another short but busy little fellow pulled him by the arm, and, rising on tiptoe, inquired in his ear whether he was Federal or Democrat.

Rip was equaly at a loss to comprehend the question, when a knowing, self-important old gentleman made his way through the crowd, pushing them to the right and left with his elbows as he passed, and planting himself before Van Winkle, with one hand on his side, the other resting on his cane, his keen eyes penetrating, as it were, into Rip's very soul, demanded, in an austere tone, what brought him to the election with a gun on his shoulder and a mob at his heels, and whether he meant to breed a riot in the village.

"Alas, gentlemen," cried Rip, somewhat dismayed, "I am a poor, quiet man, a native of the place, and a loyal subject of the king, God bless him!"

Here a general shout burst from the bystanders: "A Tory! A Tory! A spy! A refugee! Away with him!" It was with great difficulty that the self-important man restored order; and, having assumed a greater austerity of brow, demanded again of the unknown culprit what he came there for, and whom he was seeking. The poor man humbly assured him that he meant no harm, but merely came there in search of some of his neighbors who used to keep about the tavern.

"Well, who are they? Name them."

Rip bethought himself a moment, and inquired:

"Where's Nicholas Vedder?"

There was a silence for a little while, when an old man replied in a thin, piping voice:

"Nicholas Vedder! Why, he is dead and gone these eighteen years! There was a wooden tombstone in the churchyard that used to tell all about him, but that's rotten, and gone, too."



A TROOP OF CHILDREN RAN AT HIS HEELS, HOOTING AFTER HIM AND POINTING AT HIS BEARD

"Where's Brom Dutcher?"

"Oh, he went off to the army in the beginning of the war! Some say he was killed at the storming of Stony Point; others say he was drowned in a squall at the foot of Antony's Nose. I don't know—he never came back again."

"Where's Van Bummel, the schoolmaster?"

"He went off to the wars, too—was a great militia general, and is now in Congress."

Rip was grieved to hear of these sad changes and grieved to find himself so much alone in the world. Every answer puzzled him, too, by treating of such enormous lapses of time, and of matters

which he could not understand—war, Congress, Stony Point. He had no courage to ask after any more friends, but cried out in despair:

"Does nobody here know Rip Van Winkle?"

"Oh, Rip Van Winkle!" exclaimed two or three. "Oh, to be sure, that's Rip Van Winkle yonder, leaning against the tree."

Rip looked, and beheld a precise counterpart of himself as he went up the mountain—apparently as lazy, and certainly as ragged. The poor fellow was now completely confounded. He doubted his own identity, and whether he was himself or another man. In the midst of his bewilderment the self-important man demanded who he was, and what was his name.

"Goodness knows!" exclaimed he, at his wits' end. "I'm not myself—I'm somebody else—that's me yonder—no, that's somebody else got into my shoes. I was myself last night, but I fell asleep on the mountain, and they've changed my gun, and everything's changed, and I'm changed, and I can't tell what my name is or who I am!"

The bystanders now began to look at each other, nod, wink significantly, and tap their fingers against their foreheads. There was a whisper also about securing the gun, and keeping the old fellow from doing mischief, at the very suggestion of which the self-important man retired with some precipitation. At this critical moment a fresh, comely woman pressed through the throng to get a peep at the grey-bearded man. She had a chubby child in her arms, which, frightened at his looks, began to cry.

"Hush, Rip," cried she, "hush, you little dear; the old man won't hurt you."

The name of the child, the air of the mother, the tone of her voice, all awakened a train of recollections in his mind.

"What is your name, my good woman?" asked he.

"Judith Gardenier."

"And your father's name?"

"Ah, poor man, Rip Van Winkle was his name, but it's twenty years since he went away from home with his gun, and never has been heard of since. His dog came home without him; but whether he shot himself, or was carried away by the Indians, nobody can tell. I was then but a little girl."

Rip had but one question more to ask; but he put it with a faltering voice:

"Where's your mother?"

"Oh, she died but a very short time since; she broke a blood-vessel in a fit of passion at a New England pedler."

There was a drop of comfort, at least, in this intelligence. The honest man could contain himself no longer. He caught his daughter and her child in his arms and kissed them again and again.

"I am your father!" cried he. "Young Rip Van Winkle once—old



"ALAS, GENTLEMEN," CRIED RIP VAN WINKLE, "I AM A POOR MAN, A NATIVE OF THE PLACE"

स्व० श्री बेनीप्रसाद टंडन
रानीमंडी, इलाहाबाद



RIP MADE FRIENDS AMONG THE RISING GENERATION, WITH WHOM HE GREW INTO FAVOR

Rip Van Winkle now! Does nobody know poor Rip Van Winkle?"

All stood amazed, until an old woman, tottering out from among the crowd, put her hand to her brow, and, peering under it in his face for a moment, exclaimed:

"Sure enough, it is Rip Van Winkle; it is himself! Welcome home again, old neighbor! Why, where have you been these twenty long years?"

Rip's story was soon told, for the whole twenty years had been to him but as one night. The neighbors stared when they heard it; some were seen to wink at each other, and put their tongues in their cheeks.

It was determined, however, to take the opinion of old Peter Vanderdonk on the matter, who was seen slowly advancing up the road. He was a descendant of the historian of that name, who wrote one of the earliest accounts of the province.

Peter was the most ancient inhabitant of the village, and well versed in all the wonderful events and traditions of the neighborhood. He recollected Rip at once, and corroborated his story in the most satisfactory manner. He assured the company that it was a fact, handed down from his ancestor the historian, that the Catskill Mountains had always been haunted by strange beings; that it was affirmed that the great Henry Hudson, the first discoverer of the river and country, kept a kind of vigil there every twenty years, with his crew of the ship Half-moon, being permitted in this way to revisit the scenes of his enterprize, and keep a guardian eye upon the river and the great city called by his name; and that his father had once seen them in their old Dutch dresses playing at ninepins in a hollow of the mountain.

To make a long story short, the company broke up and returned to the more important concerns of the election. Rip's daughter took him home to live with her. She had a snug, well-furnished house, and a stout, cheery farmer for her husband, whom Rip recollected for one of the urchins that used to climb upon his back. As to Rip's son and heir, who was the image of himself, seen leaning against the tree, he was employed to work on the farm, but before long there were signs of a hereditary disposition to attend to anything else but his business.

Rip now resumed his old walks and habits. He soon found many of his former cronies, though all rather the worse for the wear and tear of time, and preferred making friends among the rising generation, with whom he soon grew into great favor.

Having nothing to do at home, and being arrived at that happy age when a man can be idle with impunity, he took his place once more on the bench at the inn door, and was reverenced as one of the patriarchs of the village, and a chronicle of the old times "before the war."

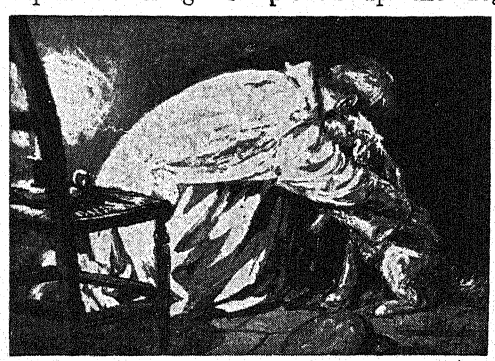
He used to tell his story to every stranger that arrived at Mr. Doolittle's hotel; the old Dutch inhabitants almost universally gave it full credit.

THE DOG THAT CAME HOME AGAIN

MOUSTAPHA was small, he was lame, he was just a tramp dog. He looked as though he had not a friend in the world. His right eye had been dreadfully damaged. His dirty wooly coat was growing grey at the ends, as if aged by the sorrows and miseries of life. He was a mongrel. You might take your choice between a terrier, a griffon, a poodle—anything. He was a freak.

Moustapha was a little dog that lived in Havre, and M. Adolphe Destroyes, a French writer, tells this charming story about him.

One night a young fellow, named Robert, who had been drinking heavily, was stumbling home through the dark streets to his lodging, when he caught sight of poor Moustapha shivering in a place of shelter. Robert was kind-hearted even when he was drinking; he stooped down, picked up the poor, forlorn dog, and carried him home to his attic. There he washed the dog's wound and bound it up with a piece of rag. Moustapha cowered and crouched before him; he did not dare even to lick the hand that tended him.



ROBERT CARESSED THE POOR DOG

On the following morning, when Robert woke up from his heavy sleep, he was surprised to see a dog in his room—a dog with a bandaged head, whose eyes were set anxiously upon his face as though hoping for a welcome. Robert recalled everything. He got up, and opened the door to send the dog away. At this Moustapha looked up at him in mute pathetic appeal, and wore such an air of helplessness that Robert's heart was touched; he gave the little dog a gentle pat, and no longer disturbed himself about so trifling a matter.

In this way a strange companionship grew up between the man and dog which lasted for two years. Between the young man and the shabby mongrel there seemed little in common; but the man consented to be loved, and the pair were really united. Moustapha's affection was always wise and discreet. He kept a proper distance, with watchful eyes. He never demanded, invited, or even begged a little patting. He was never tiresome.

When this companionship had lasted for two years, the dog fell suddenly sick with the mange. Robert was sorry for the animal but did not wish to be bothered with a sick dog. As there was no dog's hospital in Havre, he decided to drown Moustapha.

Robert waited for a dark evening, and walked with the poor, sick dog to the end of the pier. The sea was rough; there was no moon. The waves, which were full of greenish reflections, whitened as they broke against the wall.

Robert fastened a stone to a noose, picked up the dog roughly, tied the stone to the poor little animal's neck, and then flung him down into the sea. Moustapha uttered neither whine nor whimper. Nothing whatever was heard except the sound of the little body striking against the rough water. The young man, feeling a little ashamed of himself, leaned over to look. As he did so, a gust of wind swept his cap away. It was a cap embroidered by someone whom he loved. He looked anxiously in the water for his cap, saw nothing there but the foaming crests of the waves, and at last made his way home, miserable and dejected on account of this loss he had sustained.

He had been an hour in bed when he heard a scratching at his door. He jumped up and went to open it.

Moustapha stood on the threshold, with the cap between his teeth.

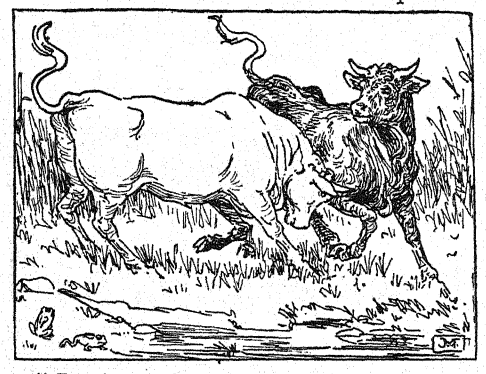
The poor dog was stained with blood; the water, trickling from his hair in strange colors, mingled with this blood and fell upon the stones. Robert knelt down and caressed the poor dog, with tears in his eyes.

Moustapha regarded his master for the last time in a very pitiful manner, uttered a little sighing cry, and died.

THE FABLES OF ÆSOP THE SLAVE

THE FROGS AND THE BULLS

A FROG one day, sitting at the edge of a pond, saw two bulls fighting in a meadow. He cried out to a companion:



"Look at that dreadful fight! What will become of us?"

"Do not let them frighten you," replied the other. "How can their quarrels affect us? They are quite different from us in every way."

"Perhaps," said the first frog, "their life is different from ours; but, as one of them will certainly get the better of the other, he who is beaten will take refuge here in the marshes, and perhaps tread on some of us. You see, therefore, we are more concerned with their quarrel than you think."

When the rich quarrel, the poor are usually the greatest sufferers.

THE GODDESS AND THE TREE

ONCE upon a time the gods agreed each to select a tree, and to guard and watch over it. Jupiter chose the oak,



Venus the myrtle, Hercules the poplar, and the others each chose a tree. Pallas, who was present, selected the olive.

"The olive shall be my tree," she said, "and my reason for choosing it is that it bears plenty of useful fruit. All the trees that you have chosen bear nothing."

Jupiter replied to her:

"Now I see that it is not without justice that you are celebrated for your wisdom, for unless there is some benefit in the things that you do, it is foolish to do them for vainglory."

Let all your actions be wise and useful.

THE LION IN LOVE

A LION one day was passing the house of a forester, when he saw there a beautiful girl, with whom he fell in love. So great was the love of the lion for her that he sought out the forester, her father, and said to him:



"I am deeply in love with your daughter. Will you give me her hand in marriage?"

The forester was astonished at such a strange request, and was at first inclined to refuse the offer of the lion. Recollecting, however, the strength of the king of beasts, and being afraid of his wrath, he replied:

"Sir Lion, I will give my consent on two conditions. These are that you have your teeth drawn out and your claws cut, for my daughter is very young and very timid, and would certainly be frightened at them."

The lion was too deeply in love to hesitate, and he willingly agreed to the forester's wishes. No sooner was he deprived of his teeth and claws, however, than the forester saw that he was harmless, and attacked and killed him.

Those who commit rash actions may live to regret them all their lives.

THE STAG IN THE OX-STALL

A STAG, being hard pressed by hounds, took refuge in an ox-stall. One of the oxen asked him why he had fled into such a place, where he was sure to be killed.

"Ah," said the stag, "if you will let me conceal myself I will be off again at the first opportunity!"

The oxen agreed, and the stag stayed there until evening approached. Many of the farm laborers came in with bundles of fodder, but did not see him. The stag started to thank the oxen, but one of them said:

"We should all be glad to help you escape; but our master has not yet been here, and nothing escapes his eyes."

Shortly after the farmer himself came to look at his men and feed the cattle. He happened to look down, and saw the stag's horns sticking out of the



straw. He immediately raised a hue-and-cry, and killed the poor stag.

Nobody looks after a man's affairs so well as he does himself.

THE CAT, THE EAGLE, AND THE SOW

HIGH among the branches of an old oak-tree an eagle was rearing her young. A cat and her kittens lived in a hole in the middle, and a sow with her little pigs sheltered in a hollow at the bottom of the tree. One day the cat climbed up to the eagle and said:

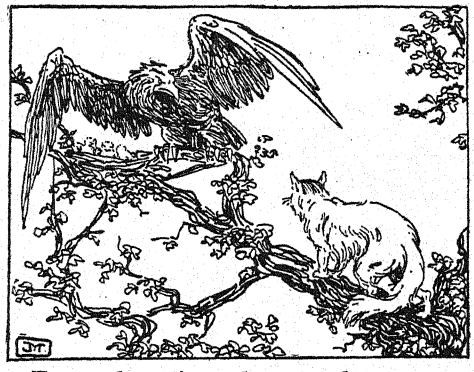
"My good neighbor, we are in great anger. That dirty sow below is digging at the roots of this tree so that she can overthrow it and get at our young ones. You must do as you please, but I, for my part, intend to stay at home and watch what she does."

The eagle was much frightened, and the cat then left her and visited the sow.

"I hope, neighbor," she said, "that you do not intend to go abroad to-day."

"Why not?" asked the sow.

"Oh," replied the sly cat, "I overheard the eagle promise her young a fine fat little pig for dinner the first time she saw you go out! I must hurry home, for she may fancy one of my kittens."



From that time the cat always went out for food by night, so that the eagle and the sow should think that she kept careful watch. Accordingly, they, too, kept at home. The result was that their young were all starved, and became a prey to the cat and her kittens.

Beware of mischief-makers.

THE MAN AND HIS NEGRO SERVANT

ONE day a man engaged a negro servant. It was the first time that he had ever seen one, and he thought that the black color of his skin was due to his failure to keep himself clean.

"Put him into a tub," he said to his other servants, "and scrub him well until he is clean and white again."



His servants set to work. They scrubbed and scrubbed, they washed and scoured, but all to no purpose. At last the negro caught a cold and died.

Many people attempt to do quite impossible tasks through ignorance.

WHEN DID YOU LAST SEE YOUR FATHER?

COLONEL SIDNEY was a Royalist colonel, brave, handsome, gay, and so kind that every peasant adored him. To his little son this splendid Cavalier was something like a god.

When his father had to hide from the Roundheads, and his mother expected every moment to have them searching her castle, the little boy knew that he must say nothing of his father's hiding-place. When the Puritans came and searched for Colonel Sidney, the boy knew that they would question him, and that he must save his father. The Puritans gave up the search, and retired to the great hall, to which they summoned the ladies.

The boy listened to the questions and answers, and heard his mother tell a lie to save his father's life. Presently one of the Puritans whispered to another, and one rose and spoke to the chief, who glanced at the handsome boy, and said:

"Yes, it is good counsel; we will question the little lad at once."

The mother was told to stand on one side, and the boy was summoned and came forward to the table. He stood before his judges, upright, strong, and handsome, the image of his father. He appeared quite calm, but his heart was hammering against his ribs, and the palms of his hands were clammy with dread. He had a giant's task on his young soul—not to betray his father, and not to tell a lie.

One of the Puritans, leaning towards him, said, in a slow and menacing voice:

"The Lord God consumes with everlasting fire those who tell falsehoods, and all those will be punished whom the Lord casts away in His indignation and wrath. Now, listen to me—I ask you, in the name of the Lord God,—When did you last see your father?"

The boy replied in a voice that was steady and firm:

"I saw Colonel Sidney last night."

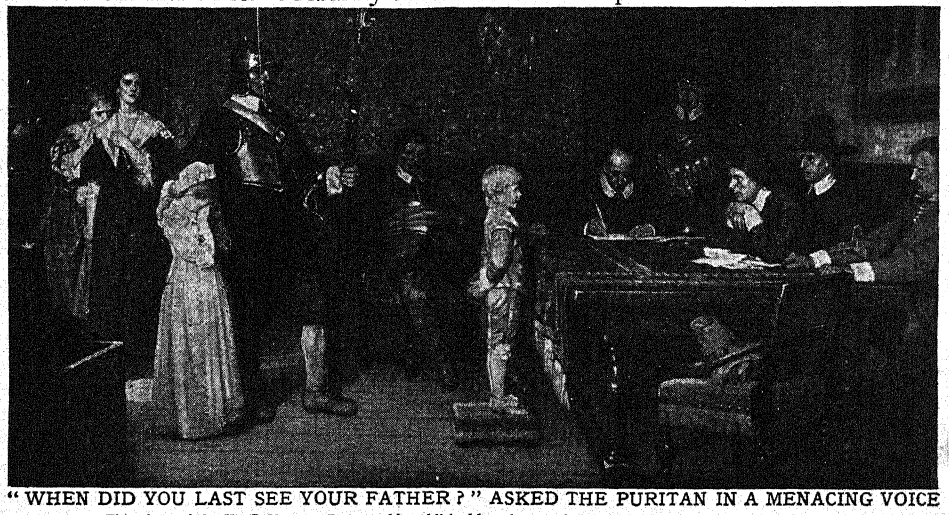
"Last night!" they exclaimed.

"And he told me," continued the boy fearlessly, "to fear God, and honor the king, and love my country."

"Last night?" cried one of the judges. "Then it was in the castle?"

"Yes."

"What part of the castle?"



"WHEN DID YOU LAST SEE YOUR FATHER?" ASKED THE PURITAN IN A MENACING VOICE

This picture is by W. F. Yeames, R.A., and is published here by permission of the Walker Art Gallery, Liverpool.

"I will show you."

They rose excitedly, and the boy led them to a room with a little bed in it.

"It was here," he said.

"Whose room is this?"

"It is mine."

"And your father came to you here last night?"

"Yes, he did."

"Where did he go afterwards?"

"I do not know. I was asleep when he came, and I was still sleeping when he went."

"What mean you by that?"

"The last time I saw my father," replied the boy, "was in a dream."

THE NEXT STORIES ARE ON PAGE 4983.

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